Program of the Sessions

New Orleans, Louisiana, January 6–9, 2011

Tuesday, January 4

AMS Short Course on Computational Topology, Part I

8:30 AM – 5:00 PM   **Rhythms II, 2nd Floor, Sheraton**

Organizer: **Afra Zomorodian**, Dartmouth College

7:45AM   Registration (outside the Rhythms Ballroom, 2nd Floor).

8:30AM   *Topological data analysis.*
(1)   **Afra Zomorodian**, Dartmouth College

10:00AM   Break.

10:30AM   *Persistent Topology*
(2)   **Gunnar Carlsson**, Stanford University

1:30PM   *Topological Dynamics: rigorous numerics*
(3)   *via cubical homology.*
Marian Mrozek, Jagiellonian University, Poland

3:00PM   Break.

3:30PM   Software Session.

AMS Short Course on Evolutionary Game Dynamics, Part I

9:00 AM – 5:00 PM   **Rhythms I, 2nd Floor, Sheraton**

Organizer: **Karl Sigmund**, University of Vienna

7:45AM   Registration (outside the Rhythms Ballroom, 2nd Floor).

9:00AM   *Introduction to evolutionary games.*
(4)   **Karl Sigmund**, University of Vienna

10:15AM   Break.

10:45AM   *Extensive form games, asymmetric*
(5)   *games and games with continuous strategy spaces.*
Ross Cressman, Wilfred Laurier University

2:00PM   *Global and unilateral adaptive dynamics.*
(6)   **Sylvain Sorin**, Université Pierre et Marie Curie, Paris

3:15PM   Break.

3:45PM   *Deterministic evolutionary game*
(7)   *dynamics.*
Josef Hofbauer, University of Vienna

MAA Short Course on What is a Matroid? Theory and Applications, From the Ground Up, Part I

9:00 AM – 5:00 PM   **Rhythms III, 2nd Floor, Sheraton**

Organizer: **Nancy Ann Neudauer**, Pacific University

7:45AM   Registration (outside the Rhythms Ballroom, 2nd Floor).

9:00AM   *Matroids you have known.*
(8)   **Nancy Ann Neudauer**, Pacific University

9:45AM   Break.

10:00AM   *Cryptomorphisms and optimization.*
(9)   **Jenny McNulty**, University of Montana

The time limit for each AMS contributed paper in the sessions is ten minutes. The time limit for each MAA contributed paper varies. In the Special Sessions the time limit varies from session to session and within sessions. To maintain the schedule, time limits will be strictly enforced.

For papers with more than one author, an asterisk follows the name of the author who plans to present the paper at the meeting.

Papers flagged with a solid triangle (▶) have been designated by the author as being of possible interest to undergraduate students.

Abstracts of papers presented in the sessions at this meeting will be found in Volume 32, Issue 1 of *Abstracts of papers presented to the American Mathematical Society*, ordered according to the numbers in parentheses following the listings. The middle two digits, e.g., 897-**20**-1136, refer to the Mathematical Reviews subject classification assigned by the individual author. Groups of papers for each subject are listed chronologically in the *Abstracts*. The last one to four digits, e.g., 897-20-**1136**, refer to the receipt number of the abstract; abstracts are further sorted by the receipt number within each classification. MAA abstracts are listed toward the back of the issue sorted by session name.

1:30PM *Matroid representations.*
(10) **Gary Gordon**, Lafayette College

3:00PM Break.

3:20PM *Matroid operations.*
(11) **Dillon Mayhew**, Victoria University of Wellington

Wednesday, January 5

AMS Department Chairs Workshop

8:00 AM – 6:30 PM   Bayside C, 4th Floor, Sheraton

Presenters: **Timothy Hodges**, University of Cincinnati
John Meakin, University of Nebraska-Lincoln
Helen Roberts, Montclair State University
Stephen Robinson, Wake Forest University

AMS Short Course on Computational Topology, Part II

8:30 AM – 5:00 PM   Rhythms II, 2nd Floor, Sheraton

Organizer: **Afra Zomorodian**, Dartmouth College

8:30AM *Euler calculus for sensor data.*
(12) **Robert Ghrist**, University of Pennsylvania

10:00AM Break.

10:30AM *Topology in Robotics: Planning with*
(13) *uncertainty.*
Michael Erdmann, Carnegie Mellon University

1:30PM *Optimization of cycles and bases.*
(14) **Jeff Erickson**, University of Illinois at Urbana-Champaign

3:00PM Break.

3:30PM Panel Discussion.

MAA Ancillary Workshop on Statistics

8:30 AM – 5:00 PM   Nottoway Room, 4th Floor, Sheraton

Teaching introductory statistics following GAISE and the Common Core.
Presenter: **Robert Gould**, University of California Los Angeles

AMS Short Course on Evolutionary Game Dynamics, Part II

9:00 AM – 5:00 PM   Rhythms I, 2nd Floor, Sheraton

Organizer: **Karl Sigmund**, University of Vienna

9:00AM *Stochastic evolutionary game dynamics.*
(15) **Bill Sandholm**, University of Wisconsin

10:15AM Break.

10:45AM *Evolution of cooperation in finite*
(16) *populations*
Sabin Lessard, Université de Montréal

2:00PM Each lecturer will give a 25-minute presentation on some open problems for discussion and interaction.

MAA Short Course on What is a Matroid? Theory and Applications, From the Ground Up, Part II

9:00 AM – 5:00 PM   Rhythms III, 2nd Floor, Sheraton

Organizer: **Nancy Ann Neudauer**, Pacific University

9:00AM *Transversal matroids.*
(17) **Joseph Bonin**, The George Washington University

10:30AM Break.

10:45AM *Oriented matroids.*
(18) **Winfried Hochstättler**, Fern Universität, Hagen Germany

2:15PM *Research in matroids.*
(19) **James Oxley**, Louisiana State University

3:45PM Break.

4:00PM Concluding Session: Tying it together.

MAA Board of Governors

9:00 AM – 5:00 PM   Mardi Gras D, 3rd Floor, Marriott

AMS Council

1:30 PM – 10:00 PM   Mardi Gras E, 3rd Floor, Marriott

Joint Meetings Registration

3:00 PM – 7:00 PM   Across from La Galerie 4, 2nd Floor, Marriott

Thursday, January 6

Joint Meetings Registration

7:30 AM – 6:00 PM   Across from La Galerie 4, 2nd Floor, Marriott

MAA Session on Harnessing Mobile Communication Devices and Online Communication Tools for Mathematics Education, I

7:40 AM – 10:55 AM   Grand Couteau Room, 5th Floor, Sheraton

Organizers: **Michael B. Scott**, California State University Monterey Bay
Jason A. Aubrey, University of Missouri-Columbia

7:40AM *Real Messy Statistics and Survey Monkey.*
▶ (20) **Robb Sinn**, North Georgia College &
State University (1067-H1-2407)

8:00AM *Mobile Jumpstarts in a First Semester*
▶ (21) *Calculus Course.* Preliminary report.
Jason D Holland, Abilene Christian
University (1067-H1-318)

8:20AM *Blogging Together: Using a Class Blog to*
▶ (22) *Enhance Learning in a Proof-Writing*
Class.
Jill E Jordan, Houghton College
(1067-H1-1336)

8:40AM *Mashups for course websites with Yahoo!*
▶ (23) *Pipes.*
Matthew Leingang, New York University
(1067-H1-1791)

9:00AM *Communicating Mathematically Through*
(24) *Podcasts.*
Sherrie Serros*, University of Wisconsin -
Eau Claire, **Erick B Hofacker**, University
of Wisconsin - River Falls, and **Rebecca
Ledocq**, University of Wisconsin - La
Crosse (1067-H1-2036)

9:20AM *Using iPad class devices as entries into a*
▶ (25) *situationally aware digital library to*
provide JIT/JIP (Just in Time/Just in Place)
Mathematics.
Frank Wattenberg, United States Military
Academy (1067-H1-2237)

9:40AM *Life After Our 2010 MAA PREP –*
(26) *Emerging Technologies.*
Erick B Hofacker*, **Kathryn T Ernie**,
University of Wisconsin - River Falls,
Sherrie Serros, University of Wisconsin -
Eau Claire, **Kay Shager**, University of
Wisconsin - River Falls, and **Charles
Serros**, University of Wisconsin - Eau
Claire (1067-H1-2051)

10:00AM *Interactive Math for (Almost) All Devices.*
▶ (27) **Andrew J Cousino*** and **Andrew G
Bennett**, Kansas State University
(1067-H1-2130)

10:20AM *On-Demand Mathematics: Creative Uses*
▶ (28) *for Smartpen Technology.* Preliminary
report.
Jeremy M Riehl*, **Lee A Evans** and
Kristin M Arney, United States Military
Academy (1067-H1-2186)

10:40AM *Using Facebook in a Discrete*
▶ (29) *Mathematics course.*
Klay Kruczek, Western Oregon University
(1067-H1-2206)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, I

8:00 AM – 10:50 AM   Orleans, 3rd
                                      Floor, JW Marriott

Organizers: **Darren A. Narayan**,
Rochester Institute of
Technology
Bernard Brooks, Rochester
Institute of Technology

Jobby Jacob, Rochester
Institute of Technology
Jacqueline A. Jensen, Sam
Houston State University
Carl V. Lutzer, Rochester
Institute of Technology

8:00AM *On Supersingular Elliptic Curves and*
▶ (30) *Hypergeometric Functions.*
Keenan Monks, Hazleton Area High
School (1067-11-1398)

8:30AM *Statistical Analysis of Diagnostic*
▶ (31) *Accuracy With Applications to Cricket.*
Lauren Mondin*, **Scott Clark**, **Courtney
Weber**, **Jessica Winborn** and **Melinda
Holt**, Sam Houston State University
(1067-62-1380)

9:00AM *Applications of and Alternatives to*
▶ (32) *Algorithm X for the Exact Cover Problem.*
Eddie B Tu, Randolph-Macon College,
and **Bjorn S Wastvedt***, St. Olaf College
(1067-68-191)

9:30AM *Packets, Solving Symmetries and Sudoku.*
(33) **Harrison Craig Chapman***, Bowdoin
College, and **Malcolm E Rupert**, Western
Washington University (1067-13-167)

10:00AM *Unitary Equivalence to Matrices with*
▶ (34) *Constant Main Diagonal.* Preliminary
report.
John Myers, South Dakota School of
Mines & Technology (1067-15-125)

10:30AM *Unitary Equivalence of Vector Spaces*
▶ (35) *over the Binary Field.* Preliminary report.
Sam L Scholze*, University of
Wisconsin-Platteville, and **Ryan L
Hotovy**, University of Nebraska-Lincoln
(1067-15-126)

AMS-MAA Special Session on History of Mathematics, I

8:00 AM – 10:50 AM   Maurepas, 3rd
                                      Floor, JW Marriott

Organizers: **Sloan E. Despeaux**, Western
Carolina University
Craig G. Fraser, University
of Toronto
Deborah Kent, Hillsdale
College

8:00AM *Gauss on the Composition of Quadratic*
(36) *Forms: Group Theory without Groups.*
Preliminary report.
Lawrence A. D'Antonio, Ramapo College
of New Jersey (1067-01-623)

8:30AM *The Binomial Theorem from Newton to*
(37) *Cauchy.*
Robert E. Bradley, Adelphi University
(1067-01-941)

9:00AM *Johann Lambert's Use and*
▶ (38) *Understanding of Mathematical*
Transcendence. Preliminary report.
Bruce J. Petrie, Institute for the History
and Philosophy of Science and
Technology, University of Toronto
(1067-01-1044)

9:30AM (39) *Lambert's ideas on the use of the ruler in traditional Euclidean constructions.* **Kirsti Andersen**, Aarhus University (1067-01-1981)

10:00AM ► (40) *How "Kroneckerian" became an adjective.* **Jemma Lorenat**, Simon Fraser University (1067-01-861)

10:30AM ► (41) *Gallardo's work, a needle in a haystack.* Preliminary report. **Alejandro R. Garciadiego**, Universidad Nacional Autonoma de Mexico (UNAM) (1067-01-1090)

AMS-SIAM Special Session on Mathematics of Computation: Differential Equations, Linear Algebra, and Applications, I

8:00 AM – 10:50 AM **Borgne Room, 3rd Floor, Sheraton**

Organizers: **Susanne C. Brenner**, Louisiana State University
Chi-Wang Shu, Brown University

8:00AM (42) *Geometric and supergeometric convergence of spectral collocationd method for Volterra or Fredholm integral equations with akly singular kernels.* **Can Huang*** and **Zhimin Zhang**, Wayne State University (1067-45-1868)

8:30AM (43) *Maximum-principle-satisfying and positivity-preserving high order discontinuous Galerkin and finite volume schemes for conservation laws.* **Xiangxiong Zhang**, Brown University (1067-65-403)

9:00AM (44) *A unified approach to construct and analyze finite element methods for the Monge-Ampère equation.* **Michael J. Neilan**, Louisiana State University (1067-65-832)

9:30AM (45) *Finite Difference Methods for Viscosity Solutions of the Monge-Ampère Equation.* **Brittany D. Froese*** and **Adam M. Oberman**, Simon Fraser University (1067-65-382)

10:00AM (46) *A multipoint flux mixed finite element method on distorted quadrilaterals and hexahedra.* **Mary F. Wheeler**, **Guangri Xue***, Institute for Computational Engineering and Sciences, The University of Texas at Austin, and **Ivan Yotov**, University of Pittsburgh (1067-65-448)

10:30AM (47) *The effect of numerical integration on the finite element computation of linear functionals.* **Ivo M. Babuska**, The University of Texas at Austin, **Uday Banerjee**, Syracuse University, and **Hengguang Li***, Institute for Mathematics and its Applications (IMA), University of Minnesota (1067-03-705)

AMS-SIAM Special Session on Nonlinear Waves and Integrable Systems, I

8:00 AM – 10:50 AM **Napoleon B1, 3rd Floor, Sheraton**

Organizers: **Gino Biondini**, State University of New York at Buffalo
Barbara Prinari, University of Colorado at Colorado Springs

8:00AM (48) *Initial-Boundary-Value Problems and Inverse Scattering Methods.* Preliminary report. **Jerry L. Bona**, University of Illinois at Chicago (1067-35-1101)

8:30AM (49) *Spectral theory of nonlocal cross-interaction of two waves.* **Antonio Degasperis**, Dipartimento di Fisica, Sapienza Universita' di Roma, Italy (1067-35-762)

9:00AM (50) *The Benjamin-Ono Equation in the Zero-Dispersion Limit.* **Peter D. Miller**, University of Michigan (1067-35-990)

9:30AM (51) *Asymptotic analysis of a random matrix model, and/or application of said asymptotic analysis.* **Ken McLaughlin**, University of Arizona (1067-31-1062)

10:00AM (52) *Dark and bright soliton solutions for coupled derivative nonlinear Schrödinger equation.* **Y. Ohta**, Kobe University (1067-35-571)

10:30AM (53) *The motion of discrete curves and the discrete hodograph transformation.* **Kenichi Maruno***, The University of Texas - Pan American, **Kenji Kajiwara**, Kyushu University, **Yasuhiro Ohta**, Kobe University, and **Bao-Feng Feng**, The University of Texas - Pan American (1067-53-1083)

AMS Special Session on Mathematical Techniques in Musical Analysis, I

8:00 AM – 10:50 AM **Napoleon B3, 3rd Floor, Sheraton**

Organizers: **Robert W. Peck**, Louisiana State University
Thomas M. Fiore, University of Michigan at Dearborn

8:00AM ► (54) *Mathematical Concepts in Musical Composition.* **Dmitri Tymoczko**, Princeton (1067-00-1966)

8:30AM ► (55) *The Pentahelix: a Four-Dimensional Realization of the Spiral Array.* **Stephon Alexander**, Haverford College, **Elaine Chew***, University of Southern California, **Robert Rowe**, New York University, and **Sam Rodriguez**, Haverford College (1067-51-1552)

9:00AM *Diatonic Graphs.* Preliminary report.
► (56) **J. W. Estes*** and **William Staton**,
University of Mississippi (1067-05-369)

9:30AM *The Mathematics of Contrapuntal*
(57) *Hierarchy in Music.*
Jason D Yust, University of Alabama
(1067-05-969)

10:00AM *Wreath products and n-cube symmetry:*
► (58) *a music-theoretical application.*
Preliminary report.
Robert Peck*, Louisiana State University,
and **Jack Douthett**, University of New
Mexico (1067-20-1059)

10:30AM Spira mirabilis, for player piano.
(59) **Clifton Callender**, Florida State
University (1067-00-1969)

AMS Special Session on Integral Geometry: Analysis and Applications, I

8:00 AM – 10:50 AM Napoleon C3,
3rd Floor, Sheraton

Organizers: **Gaik Ambartsoumian**,
University of Texas,
Arlington

Gestur Olafsson, Louisiana
State University

Eric Todd Quinto, Tufts
University

Boris S. Rubin, Louisiana
State University

8:00AM *The geodesic X-ray transform in presence*
(60) *of caustics.*
Plamen Stefanov, Purdue University
(1067-53-1400)

8:30AM *Microlocal Aspects of Bistatic Synthetic*
(61) *Aperture Radar Imaging.*
Venky P Krishnan*, University of
Bridgeport, and **Eric Todd Quinto**, Tufts
University (1067-35-991)

9:00AM *Conical Distributions on the Space of Flat*
(62) *Horocycles.*
Fulton B Gonzalez, Tufts University
(1067-43-1133)

9:30AM *Reconstruction of a function from its*
(63) *spherical (circular) means with the*
centers lying on the surface of certain
polygons and polyhedra.
Leonid A Kunyansky, University of
Arizona (1067-44-534)

10:00AM *Determination of a function from*
(64) *integrals over spheres of fixed radius.*
Markus Haltmeier, Computational
Science Center, University Vienna
(1067-45-743)

10:30AM *A support theorem for the horocycle*
(65) *transform on a hyperbolic space.*
Sigurdur Helgason, MIT (1067-44-192)

AMS Special Session on Theory and Application of Stochastic Differential Equations and Stochastic Partial Differential Equations, I

8:00 AM – 10:50 AM Maurepas Room,
3rd Floor, Sheraton

Organizers: **Armando Arciniega**,
University of Texas at San
Antonio

Edward J. Allen, Texas Tech
University

**Sivapragasam
Sathananthan**, Tennessee
State University

Mahmoud Anabtawi,
American University of
Sharjah

8:00AM *Stochastic Viral Kinetics.*
(66) **Linda J. S. Allen***, Texas Tech University,
Yuan Yuan, The University of Texas MD
Anderson Cancer Center, and **Sukhitha
Vidurupola**, Texas Tech University
(1067-92-1297)

8:30AM *Differentiability Properties of Measures*
(67) *Generated by Solutions of Semilinear*
Stochastic Differential Equations.
Fariborz Asadian, Fort Valley State
University (1067-60-974)

9:00AM *Derivation Of Stochastic*
(68) *Partial Differential Equations for*
Reaction-Diffusion Processes.
Elife Dogan* and **Edward J. Allen**, Texas
Tech University (1067-60-717)

9:30AM *Systems of Kolmogorov Backward*
(69) *Equations for Two-Time-Scale Switching*
Diffusions.
Tien Nguyen Dung* and **George Yin**,
Wayne State University (1067-60-502)

10:00AM *Some results on existence and uniqueness*
(70) *of mild solutions of neutral SPDEs.*
T E Govindan, I.P.N. Mexico City, Mexico
(1067-60-1435)

10:30AM *Numerical Methods for*
(71) *Annuity-Purchasing Decision Making.*
Zhuo Jin, Department of Mathematics,
Wayne State University (1067-60-394)

AMS Special Session on Analytic and Geometric Methods in Representation Theory, I

8:00 AM – 10:50 AM Conde, 3rd Floor, JW Marriott

Organizers: **Leticia Barchini**, Oklahoma
State University

Hongyu He, Louisiana State
University

8:00AM *Rational smoothness of K-orbit closures*
(72) *in flag varieties.*
William M. McGovern, University of
Washington (1067-22-172)

8:30AM (73) *Closed form multiplicity polynomials attached to hook type Springer fibers for $SL(n, \mathbb{C})$.*
Matthew Housley, University of Utah (1067-22-1118)

9:00AM (74) *Distinguished orbits and the L-S category of simply connected compact Lie groups.*
Markus Hunziker and **Mark R. Sepanski***, Baylor University (1067-22-1219)

9:30AM (75) *Conformally invariant systems of maximal parabolic of two-step nilpotent type.*
Toshihisa Kubo, Oklahoma State University (1067-17-454)

10:00AM (76) *The geometry of Gelfand-Zeitlin fibres.* Preliminary report.
Mark Colarusso*, Université de Laval, and **Sam Evens**, University of Notre Dame (1067-22-1243)

10:30AM (77) *Invariant functionals on Speh representations.*
Siddhartha Sahi, Rutgers University (1067-22-677)

AMS Special Session on Geometric Group Theory, I

8:00 AM – 10:50 AM Napoleon C1, 3rd Floor, Sheraton

Organizers: **Joshua B. Barnard**, University of South Alabama
Pallavi Dani, Louisiana State University

8:00AM (78) *Geometric properties of Thompson's group F.*
Sean Cleary, The City College of New York, **Susan Hermiller***, University of Nebraska, **Melanie Stein**, Trinity College, and **Jennifer Taback**, Bowdoin College (1067-20-993)

8:30AM (79) *Snowflake Groups with Super-Exponential 2-Dimensional Dehn Functions.*
Quan T Tran, University of Oklahoma (1067-00-1330)

9:00AM ▶ (80) *Geometry of Houghton's Group.*
Sang Rae Lee, University of Oklahoma (1067-20-1535)

9:30AM (81) *Automorphisms of Buildings Constructed Via Covering Spaces.*
Aliska L. Gibbins, Ohio State University (1067-20-2002)

10:00AM (82) *Asymmetry of the Lipschitz metric on Outer Space.*
Yael Algom-Kfir*, Yale University, and **Mladen Bestvina**, University of Utah (1067-20-2403)

10:30AM (83) *Line Patterns in Free Groups.*
Christopher H. Cashen, University of Utah (1067-20-698)

AMS Special Session on Computational Algebraic and Analytic Geometry for Low-Dimensional Varieties, I

8:00 AM – 10:50 AM Napoleon D2, 3rd Floor, Sheraton

Organizers: **Mika K. Seppala**, Florida State University
Tanush Shaskas, Oakland University
Emil Volcheck, National Security Agency

8:00AM (84) *Geometric estimates for the Birman-Series set.* Preliminary report.
Peter Buser*, Ecole Polytechnique Fédérale de Lausanne, and **Hugo Parlier**, Université de Fribourg, Switzerland (1067-53-1954)

8:30AM (85) *Disconnectedness of Singular Loci of Moduli Spaces of Complex Curves.*
Milagros Izquierdo*, Linköping University, and **Antonio F Costa**, UNED (1067-14-418)

9:00AM ▶ (86) *Circle Packings on Affine Tori.* Preliminary report.
Christopher T. Sass*, University of Tennessee, and **G. Brock Williams**, Texas Tech University (1067-30-507)

9:30AM (87) *On Rankin's Uniformization of Algebraic Curves.*
John J. George, Florida State University (1067-30-1537)

10:00AM (88) *Using Half turns for algorithms on hyper-elliptic Riemann surfaces.* Preliminary report.
K.-D. Semmler, EPF Lausanne (1067-51-1442)

10:30AM (89) *Compact Klein surfaces of genus 5 with extremal discs.*
Gou Nakamura, Center for General Education, Aichi Institute of Technology (1067-30-1445)

AMS Special Session on Mathematical Modeling in Environmental Economics, I

8:00 AM – 10:50 AM Napoleon D3, 3rd Floor, Sheraton

Organizers: **Natali Hritonenko**, Prairie View A&M University
Yuri Yatsenko, Houston Baptist University

8:00AM ▶ (90) *Sustainable Forest Management, Logging Size, and Carbon Sequestration Under Climate Changes.*
Natali Hritonenko*, Prairie View A&M University, **Renan-Ulrich Goetz**, Department of Economics, University of Girona, and **Deonica Paxton**, Prairie View A&M University (1067-92-640)

9:00AM ▶ (91) *Computational Approach to the Solution of Random Pertubed Logistic Model.* Preliminary report.
Reza R Ahangar, Texas A & M University-Kingsville (1067-34-702)

9:30AM (92) *Optimal Use Of Mosquito treated nets and Insecticide In Controlling Malaria Disease.*
Bassidy Dembele*, Grambling State University, and **Abdul-Aziz Yakubu**, Howard University (1067-92-769)

10:00AM (93) *Poisson Arrival, Single-Processor, Exponential General Bulk Processing [M/M(m, M)/1] and Splitting Queueing System: A Mathematical Model for a Personnel Hiring Process.* Preliminary report.
Aliakbar Montazer Haghighi, Prairie View A&M University (1067-90-889)

AMS Special Session on Expander Graphs in Pure and Applied Mathematics, I

8:00 AM – 10:45 AM **Frontenac, 3rd Floor, JW Marriott**

Organizers: **Alireza Salehi Golsefidy**, Princeton University
Alexander Lubotzky, Hebrew University of Jerusalem

8:00AM ▶ (94) *Counting primes in Apollonian circle packings.*
Elena Fuchs, Institute for Advanced Study (1067-11-749)

8:30AM ▶ (95) *Constructing Small-Bias Sets from Algebraic-Geometric Codes.*
Avraham Ben-Aroya and **Amnon Ta-Shma***, Tel-Aviv University (1067-05-1120)

9:00AM (96) *Expansion and words in simple groups of Lie type.*
E. Breuillard, Universite Paris Sud, **B. Green**, University of Cambridge, **R. Guralnick***, University of Southern California, and **T. Tao**, UCLA (1067-20-389)

9:30AM (97) *On the diameter of finite simple groups.*
Emmanuel F Breuillard, Universite Paris-Sud Orsay (1067-20-844)

10:00AM (98) *Recent applications of expanders in number theory.*
Emmanuel Kowalski, ETH Zurich (1067-11-690)

MAA Invited Paper Session on The Rebirth of Special Functions

8:00 AM – 10:50 AM **Rhythms II and III, 2nd Floor, Sheraton**

Organizers: **Tewodros Amdeberhan**, Tulane University
Victor Moll, Tulane University

8:00AM ▶ (99) *Special Functions and Computer Algebra.*
Luis A Medina, University of Puerto Rico, Rio Piedras (1067-AA-1927)

8:30AM ▶ (100) *Special Functions in Combinatorics.*
Lipika Deka, California State University, Monterey Bay (1067-AA-2279)

9:00AM ▶ (101) *Special functions and modular forms in number theory.*
Amanda Folsom, Yale University (1067-AA-1292)

9:30AM ▶ (102) *Special functions, mathematical physics, and number theory.*
Mark W. Coffey, Colorado School of Mines (1067-AA-1665)

10:00AM ▶ (103) *Special Functions and High Order Finite Element Methods.*
Veronika Pillwein, RISC, Joh. Kepler Univ. Linz (1067-AA-1306)

10:30AM (104) *Special Functions and Universal Behavior in Integrable Systems.*
Peter D. Miller, University of Michigan (1067-AA-992)

AMS Session on Fluid Mechanics, I, and Mechanics

8:00 AM – 10:55 AM **Balcony N, 4th Floor, Marriott**

8:00AM (105) *On the Minimizing Total Collision Orbits in the Planar Newtonian N-body Problem.*
Hsin-Yuan Huang, School of Mathematics, University of Minnesota (1067-70-2050)

8:15AM (106) *Stability of step dynamics in nanowire growth.*
Nicholas O. Kirby, University of Kentucky (1067-74-1708)

8:30AM ▶ (107) *Analysis of Spherical Inflation Models for Intracranial Saccular Aneurysm Elastodynamics.* Preliminary report.
James Christopher Halsall, Farmingdale State College (1067-74-2286)

8:45AM Break.

9:00AM (108) *Permeability effect on magneto-convection in a mushy layer.*
Dambaru Bhatta* and **Daniel N. Riahi**, The University of Texas- Pan American, Edinburg, TX (1067-76-514)

9:15AM (109) *Inertial effects on viscous fingering in the complex plane.*
Andong He* and **Andrew Belmonte**, Penn State University (1067-76-960)

9:30AM (110) *Surface modes in inviscid free surface shear flows.*
Ahmed Kaffel* and **Michael Renardy**, Virginia Tech (1067-76-1091)

9:45AM (111) *A precise calculation of the critical Rayleigh and Wave Numbers for the Inhomogeneous Planar Bénard Problem.*
Matthew J Glomski* and **Matthew Adam Johnson**, Marist College (1067-76-1419)

10:00AM (112) *Thermal and mass flow in uniform stream with a sink and a heat source via variational technique for free boundary problems.*
Sadia M.. Makky*, Owens College, **Ali M. Ghalib**, PBS&J, Southeast Structures Division, and **Thaer S. Sliby**, Military Engineering College, Baghdad, Iraq (1067-76-1846)

10:15AM (113) *Approximations to the Navier-Stokes equation using a Leray-Iterated-Tikhonov model with Time Relaxation.* Preliminary report.
Nathaniel Mays*, **Ross Ingram**, University of Pittsburgh, **Iuliana Stanculescu**, Nova Southeastern University, and **Carolina Manica**, Instituto de Matematica - UFRGS (1067-76-2026)

10:30AM ▶ (114) *Annular stagnation flow on a moving cylinder.*
Antonio Mastroberardino, Penn State Erie, The Behrend College (1067-76-2045)

10:45AM (115) *Eventual Regularity of the Solutions to the Supercritical Dissipative Quasi-Geostrophic Equation.*
Michael G Dabkowski, University of Wisconsin-Madison (1067-76-2219)

9:30AM (121) *Ribbon Graphs and Twisted Duality.*
Joanna A. Ellis-Monaghan*, Saint Michael's College, and **Iain Moffatt**, University of South Alabama (1067-05-130)

9:45AM (122) *Some graph theoretical results for the task mapping problem for parallel computers.* Preliminary report.
Janet L. Fierson, United States Military Academy at West Point (1067-05-2374)

10:00AM (123) *Complex Contagions on Graph Dynamical Systems.*
Leon Chang, Columbia University, and **Siddharth S Raval***, Reed College (1067-05-208)

10:15AM (124) *Amalgamations and Detachments of Hypergraphs.*
Amin Bahmanian, Auburn University (1067-05-190)

10:30AM (125) *On Hyperstar Decompositions of Hypergraphs.*
Amin Bahmanian and **Dan Roberts***, Auburn University (1067-05-2312)

10:45AM ▶ (126) *Packing sparse hypergraphs.*
Christopher J Stocker*, **Alexandr V Kostochka**, University of Illinois at Urbana-Champaign, and **Peter Hamburger**, Western Kentucky University (1067-05-2388)

AMS Session on Combinatorics and Graph Theory, I

8:00 AM – 10:55 AM   **Southdown Room, 4th Floor, Sheraton**

8:00AM (116) *Cycle-saturated graphs with minimum number of edges.*
Younjin Kim* and **Zoltan Furedi**, University of Illinois at Urbana and Champaign (1067-05-423)

8:15AM (117) *Gregarious Path Decompositions of Some Graphs.*
Guven Yuceturk* and **Hoffman G. Dean**, Auburn University (1067-05-2387)

8:30AM (118) *Algebraic and Graph-Theoretic Properties of the Box Product of Two Paths.*
Daniel Pragel, University of Arkansas Fort Smith (1067-05-646)

8:45AM ▶ (119) *Firefighting on Random Geometric Graphs.* Preliminary report.
Amir Barghi* and **Peter Winkler**, Dartmouth College (1067-05-790)

9:00AM (120) *Making graphs crossing-critical by multiplying their edges.*
Gelasio Salazar*, Instituto de Fisica. Universidad Autonoma de San Luis Potosi, Mexico, **Cesar Hernandez-Velez**, Instituto de Fisica, Universidad Autonoma de San Luis Potosi, Mexico, and **Laurent Beaudou**, Polytech Clermont-Ferrand (1067-05-2151)

9:15AM Break

AMS Session on Combinatorics and Graph Theory, II

8:00 AM – 10:55 AM   **Bayside B, 4th Floor, Sheraton**

8:00AM (127) *Deformation Retracts of Neighborhood Complexes of Stable Kneser Graphs.* Preliminary report.
Matthew D Zeckner* and **Benjamin J Braun**, University of Kentucky (1067-05-980)

8:15AM (128) *Iterated Iteratedly Piecewise Continuous Function Order Pattern Probability Distributions.*
Adam Hesterberg, Princeton University (1067-05-1851)

8:30AM ▶ (129) *Distribution Networks - A Generalization to Graphs: more application and less fuzzification.*
Omid Ghayour Najafabad, Chamran University (1067-05-2175)

8:45AM (130) *Integer invariants of skew lines in PG(3,q).*
Joshua E Ducey, University of Florida (1067-05-1773)

9:00AM ▶ (131) *Partitions, Young diagrams and ballot numbers.*
RJ Dolbin, Pepperdine University (1067-05-914)

9:15AM (132) *An efficient tree-based computation of a natural diffusion distance.*
Maxim J. Goldberg, Ramapo College of NJ, and **Seonja Kim***, SUNY Rockland Community College (1067-05-1043)

9:30AM *The excedance algebra.* Preliminary
▶ (133) report.
Eric L. Clark* and **Richard Ehrenborg**,
University of Kentucky (1067-05-377)

9:45AM *Towers of Algebras, Combinatorial Hopf*
(134) *Algebras and Dual Graded Graphs.*
Nantel Bergeron, York University,
Thomas Lam, University of Michigan,
and **Huilan Li***, Drexel University
(1067-05-1257)

10:00AM *Reduced decompositions and*
(135) *permutation patterns generalized to the*
higher Bruhat order.
Delong Meng, MIT (1067-05-337)

10:15AM *The Weak Bruhat Order and Separable*
▶ (136) *Permutations.*
Fan Wei, Massachusetts Institute of
Technology (1067-05-872)

10:30AM *Shuffles of permutations.*
(137) **Camillia Smith Barnes**, Sweet Briar
College (1067-05-2082)

10:45AM *Enumerating embeddings under*
▶ (138) *generalized factor orders.* Preliminary
report.
Thomas Langley*, Rose-Hulman
Institute of Technology, and **Jeffrey**
Remmel, University of California, San
Diego (1067-05-2322)

MAA Session on Fostering, Supporting, and Propagating Math Circles for Students and Teachers, I

8:00 AM – 10:55 AM **St. Jerome, 3rd**
Floor, JW Marriott

Organizers: **Tatiana Shubin**, San Jose
State University
Elgin H. Johnston, Iowa
State University
James Tanton, St. Mark's
Institute of Mathematics

8:00AM *A Sampling of Successful Math Circle*
▶ (139) *Topics*
James S Tanton, St. Mark's Institute of
Mathematics (1067-F1-1630)

8:20AM *Creating a Math Circle for*
(140) *Underrepresented Minority Students.*
Manda Riehl, University of Wisconsin,
Eau Claire (1067-F1-2290)

8:40AM *Sophie Math: a Math Circle Program for*
(141) *Girls.*
Silva Chang* and **Anne M Dougherty**,
University of Colorado at Boulder
(1067-F1-1903)

9:00AM *The San Francisco Math Circle: An*
▶ (142) *experiment in providing mathematical*
enrichment to "unenriched" students.
Paul Zeitz, University of San Francisco
(1067-F1-1638)

9:20AM *San Francisco Math Circle: Examples of*
▶ (143) *good "small group" mathematical*
activities.
Paul Zeitz, University of San Francisco
(1067-F1-1646)

9:40AM *Obtaining funding for a Math Teachers'*
(144) *Circle: One group's journey.*
Angela Hodge, North Dakota State
University (1067-F1-2150)

10:00AM *Resources for math circles.*
▶ (145) **Dave Auckly**, Mathematical Sciences
Research Institute (1067-F1-2394)

10:20AM *Math Teachers' Circles - Impacting*
(146) *Teachers' Mathematical Knowledge for*
Teaching.
Diana White, University of Colorado
Denver (1067-F1-2067)

10:40AM *How Do Math Teachers' Circles Affect*
(147) *Teachers? Themes from Teacher Surveys.*
Diana White, University of Colorado
Denver, and **Brianna Donaldson***,
American Institute of Mathematics
(1067-F1-2107)

MAA Session on the Scholarship of Teaching and Learning in Collegiate Mathematics, I

8:00 AM – 10:55 AM **Rhythms I,**
2nd Floor, Sheraton

Organizers: **Jacqueline M. Dewar**,
Loyola Marymount University
Thomas F. Banchoff, Brown
University
Pam Crawford, Jacksonville
University
Edwin P. Herman, University
of Wisconsin-Stevens Point
Nathan Wodarz, University
of Wisconsin-Stevens Point

8:00AM *Changing Scales, Changing Perspectives.*
(148) **Carrie Muir**, University of Colorado,
Boulder (1067-V1-411)

8:20AM *The Use of Videos to Encourage Pre-Class*
▶ (149) *Preparation.* Preliminary report.
Francesco J. Echeverria and **James S.**
Rolf*, United States Air Force Academy
(1067-V1-2147)

8:40AM *Mathematical Word Problems: An*
▶ (150) *Instructional Approach that evolved from*
its Cognitive Complexities.
Jerry C. Obiekwe, The university of
Akron-Wayne College (1067-V1-485)

9:00AM *A Collaborative Process for Developing*
(151) *Digital Learning Materials: An Analysis of*
Student Performance and Feedback.
Robert Hoar, **Jennifer Kosiak**, **Karoline**
Auby* and **James Sobota**, University of
Wisconsin-La Crosse (1067-V1-863)

9:20AM *Using Visual Cues in Teaching*
▶ (152) *Computational Skills.*
Gretchen Rimmasch* and **Jim Brandt**,
Southern Utah University (1067-V1-1516)

9:40AM *Learning Effects of Examples Applied to*
▶ (153) *College Algebra Student Interests.*
Carrie A Campbell, Lincoln, NE
(1067-V1-1918)

10:00AM (154) *The Effects of NCAT's Redesign on Student Learning in Beginning Statistics.* **Aubrey D. Magoun***, **David Hare** and **Charlotte H. Owens**, The University of Louisiana at Monroe (1067-V1-52)

10:20AM ▶ (155) *An analysis of student understanding of voting power in a a quantitative literacy class.* Preliminary report. **Curtis D. Bennett***, **Suzanne Larson** and **Laura J. Massa**, Loyola Marymount University (1067-V1-2246)

10:40AM ▶ (156) *Comparing geometry curriculums: The impact on pre-service elementary teachers' pedagogical content knowledge.* Preliminary report. **Hortensia Soto- Johnson**, **Sarah Rozner*** and **Kristin Noblet**, University of Northern Colorado (1067-V1-1998)

MAA Session on Wavelets In Undergraduate Education, I

8:00 AM – 10:55 AM **Mardi Gras BC, 3rd Floor, Marriott**

Organizers: **Caroline Haddad**, SUNY Geneseo

Catherine A. Beneteau, University of South Florida

David K. Ruch, Metropolitan State College of Denver

Patrick J. Van Fleet, University of St. Thomas

8:00AM (157) *Introducing Wavelets to First Years and Sophomores.* **Rachel J Weir**, Allegheny College (1067-Y5-1925)

8:20AM ▶ (158) *Efficiently Programming RGB-to-HSI Conversion.* **Joseph M Gonzalez***, **Brian K Holder-Chow Lin On**, **Robert Le** and **Michael Anthony Miller**, University of South Florida (1067-Y5-1606)

8:40AM ▶ (159) *Undergraduate Research Projects on Pansharpening.* Preliminary report. **John Merkel***, Oglethorpe University, **Patrick Van Fleet**, University of St. Thomas, and **David Ruch**, Metropolitan State College of Denver (1067-Y5-1829)

9:00AM ▶ (160) *Using Wavelets and Statistics to Detect Differences.* Preliminary report. **Edward F Aboufadel**, Grand Valley State University (1067-Y5-1752)

9:20AM ▶ (161) *Denoising Capillary Electrophoresis Signals with Wavelets.* Preliminary report. **Bruce Atwood***, **Kevin Braun** and **Tess Jacquez**, Beloit College (1067-Y5-1561)

9:40AM ▶ (162) *Undergraduate research in wavelets and circadian rhythms.* Preliminary report. **Tanya Leise**, Amherst College (1067-Y5-981)

10:00AM ▶ (163) *Exploring Biomedical Signals with the Maple Wavelets Package.* **Jeff Knisley**, East Tennessee State University (1067-Y5-2085)

10:20AM ▶ (164) *Lloyd-Max Quantization Schemes.* **Helmut Knaust**, University of Texas at El Paso (1067-Y5-1826)

10:40AM ▶ (165) *Wavelets and Lifting.* Preliminary report. **Patrick J Van Fleet**, University of St. Thomas (1067-Y5-1611)

MAA General Contributed Paper Session, I

8:00 AM – 10:55 AM **St. Claude, 3rd Floor, JW Marriott**

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

8:00AM ▶ (166) *An Action Research Report: Does the Ability to Purchase a Week's Worth of Groceries for under One Dollar Influence the Chance that a Student will make an "Innumeracy Type" Statistical Error?* **Larry Wayne Lewis**, Spalding University (1067-Z1-1756)

8:15AM ▶ (167) *Rectangular to Polar Transformations.* Preliminary report. **Gerald M. Higdon**, Fitchburg State University (1067-Z1-1143)

8:30AM ▶ (168) *Chebyshev Polynomials and their Relationship to Trigonometry and the Fibonacci Numbers.* Preliminary report. **John C Maceli**, Ithaca College NY (1067-Z1-2214)

8:45AM Break

9:00AM ▶ (169) *A Blended Approach to Teaching Finite Mathematics at the University of Illinois.* Preliminary report. **Jesse E Miller**, University of Illinois at Urbana-Champaign (1067-Z1-845)

9:15AM ▶ (170) *Teaching Finite Mathematics Using Online Homework System.* **Yun Lu**, Kutztown University of Pennsylvania (1067-Z1-2330)

9:30AM ▶ (171) *Initial Assessment of an Enhanced College Algebra Course.* Preliminary report. **Robert Wieman**, Virginia State University (1067-Z1-2351)

9:45AM (172) *How to teach college classes with a large diversity in students abilities and interest.* **Josip Derado**, Kennesaw State University (1067-Z1-1990)

10:00AM (173) *Comparison of Student Performance between Inquiry Based Learning and Lecture Methods when Teaching Induction.* Preliminary report. **Michael S. Gagliardo**, Jacksonville University (1067-Z1-1020)

10:15AM ▶ (174) *Service-learning in Mathematics Curriculum.* Preliminary report. **Natali Hritonenko***, **Lauretta Byars** and **Alisha Lowe**, Prairie View A&M University (1067-Z1-1027)

10:30AM *Improving Learning Through a Lesson*
▶ (175) *Study Community of Practice.* Preliminary
report.
Joy L. Becker* and **Laura J. Schmidt**,
University of Wisconsin-Stout
(1067-Z1-1352)

10:45AM *Connecting student knowledge and*
▶ (176) *course performance at the University of*
Illinois.
Alison Ahlgren*, University of Illinois,
and **Marc Harper**, UCLA (1067-Z1-583)

MAA *General Contributed Paper Session, II*

8:00 AM – 10:55 AM   **Great Ballroom**
E, 5th Floor, Sheraton

Organizers: **Kristen Meyer**, Wisconsin
Lutheran College

Thomas R. Hagedorn, The
College of New Jersey

8:00AM *Differences between Mathematicians and*
▶ (177) *Physicists.*
Tevian Dray* and **Corinne A. Manogue**,
Oregon State University (1067-Z1-2355)

8:15AM *Super Greedy Type Algorithms.*
(178) **Entao Liu**, University of South Carolina
(1067-Z1-1265)

8:30AM *Convexity Adjustment in the Valuation of*
▶ (179) *the Financial Derivatives.* Preliminary
report.
Alejandra Sánchez, Universidad
Complutense de Madrid; Universidad
Nacional de Colombia- Bogotá
(1067-Z1-1741)

8:45AM *An Adaptive Spectral Element Method to*
(180) *Price American Options.* Preliminary
report.
Matthew Willyard* and **David A.**
Kopriva, Florida State University
Mathematics (1067-Z1-2019)

9:00AM *Modeling Time-Dependent Electroosmotic*
▶ (181) *Flow.* Preliminary report.
Emese Lipcsey-Magyar*, North Carolina
State University, **Ava Hamilton**, **Rachel**
Roe-Dale, **Kimberley Frederick** and
Katherine Roguski, Skidmore College
(1067-Z1-1760)

9:15AM *A mixed implicit-explicit multirate*
(182) *numerical scheme for time-dependent*
equations.
Brandon Chabaud* and **Qiang Du**,
Pennsylvania State University
(1067-Z1-1574)

9:30AM *A novel method for solving nonlinear*
(183) *equations.*
Mohsen Mahmood Doroodchi*,
Cardinal Stritch University, **Habibolla**
Latifizadeh and **Esmail Hesameddini**,
Shiraz University of Technology, Shiraz,
Iran (1067-Z1-683)

9:45AM *Gibbs Measures for Unbounded Local*
(184) *Energy Functions on* $\mathbb{N}^{\mathbb{Z}^d}$.
Stephen R Muir, University of North
Texas (1067-Z1-1266)

10:00AM *Existence and Stability of Standing Wave*
(185) *Solutions Arising from Synaptically*
Coupled Neuronal Networks.
Melissa A Stoner* and **Linghai Zhang**,
Lehigh University (1067-Z1-1261)

10:15AM *Real Time Boundary Element Node*
▶ (186) *Location Optimization.* Preliminary
report.
J D Menges, United States Military
Academy (1067-Z1-2337)

10:30AM *Optimal Control.*
▶ (187) **Qingxia Li**, Lincoln University
(1067-Z1-733)

10:45AM *Periodic solutions of Some Ecological*
(188) *Models with Strong Allee Effects.*
Smita Pati, Birla Institute of Technology,
Mesra, Ranchi (1067-Z1-2428)

MAA *General Contributed Paper Session, III*

8:00 AM – 10:55 AM   **Grand Chenier**
Room, 5th Floor, Sheraton

Organizers: **Kristen Meyer**, Wisconsin
Lutheran College

Thomas R. Hagedorn, The
College of New Jersey

8:00AM *Al-Kashi's Key to Arithmetic: Its Context,*
▶ (189) *Contents, and Educational Impact*
Up Through the Ottoman Empire.
Preliminary report.
Osama H. Taani, New Mexico State
University (1067-Z1-1636)

8:15AM *Euler Drives the Leibniz Machine and*
▶ (190) *Takes the Log and Trig Functions out for*
a Spin on the Complex Numbers.
David Dennis, San Bernardino, CA, and
Susan L. Addington*, California
State University, San Bernardino
(1067-Z1-1935)

8:30AM *The intellectual journey of Hua Loo-keng*
(191) *from China to the Institute of Advanced*
Studies.
Jean W. Richard* and **Abdramane**
Serme, BMCC/CUNY-The City University
of New York (1067-Z1-2178)

8:45AM *Fibonacci, Liber Abaci, and Medieval*
(192) *Mathematics.*
Charlie L. Smith, Park University
(1067-Z1-2249)

9:00AM *Mr. Peacock's Calculus Text of 1820*
▶ (193) *and Its Place in Calculus Reform at*
Cambridge.
Richard H Stout, Gordon College
(1067-Z1-1982)

9:15AM *The Real Story of Edward Lorenz.*
▶ (194) **Jody Sorensen**, Augsburg College
(1067-Z1-1568)

9:30AM *Fixing Fluxions: Benjamin Robins'*
▶ (195) *response to Berkeley's "The Analyst".*
Eugene C. Boman, Penn State,
Harrisburg campus (1067-Z1-1910)

9:45AM *Revisiting Lester Hill.*
▶ (196) **Chris Christensen**, Northern Kentucky
University (1067-Z1-444)

10:00AM ▶ (197) *How Christiaan Huygens Tuned the Musical Scale.*
John F. Bukowski, Juniata College (1067-Z1-1923)

10:15AM ▶ (198) *Counting.*
Patricia Baggett*, New Mexico State University, and **Andrzej Ehrenfeucht**, University of Colorado (1067-Z1-480)

10:30AM ▶ (199) *Math vs. Maths: A Yankee Mathematician in Sir Isaac's Court.*
Samuel M Hansen, University of Nevada, Las Vegas/ACMEScience (1067-Z1-1158)

10:45AM ▶ (200) *Fifty years of College Math. Have I learned anything?*
Bryan V Hearsey, Lebanon Valley College (1067-Z1-2236)

SIAM Minisymposium on Applications of Difference and Differential Equations in Ecology and Epidemiology, I

8:00 AM – 10:55 AM   Bayside A, 4th Floor, Sheraton

Organizers: **Zhilan Feng**, Purdue University
Yun Kang, Arizona State University

8:00AM (201) *Modeling Vertical Transmission in Mosquito-Transmitted Diseases.*
James M Hyman*, Tulane University, **Nakul Chitnis**, Swiss Tropical Institute, and **Carrie Manore**, Oregon State University (1067-92-936)

8:30AM (202) *Spatiotemporal variation of mistletoes: a dynamic modeling approach.*
Rongsong Liu*, **Carlos Martinez del Rio**, University of Wyoming, and **Jianhong Wu**, York University (1067-92-1005)

9:00AM (203) *Network epidemics with just one equation.*
Joel C Miller*, Harvard School of Public Health, and **Erik Volz**, University of Michigan (1067-92-874)

9:30AM ▶ (204) *Hepatitis C virus drug resistance and modeling.*
Libin Rong*, Oakland University, **Harel Dahari**, University of Illinois Chicago, **Ruy Ribeiro** and **Alan Perelson**, Los Alamos National Lab (1067-92-694)

10:00AM (205) *Uniform Persistence in Discrete and Continuous Non-autonomous Dynamical Systems with Application to an Epidemic Model of an Amphibian Population.* Preliminary report.
Paul Leonard Salceanu, University of Louisiana at Lafayette (1067-92-570)

10:30AM ▶ (206) *Disease Dynamics and Allee effect in Discrete-time Population Models.* Preliminary report.
Abdul-Aziz Yakubu*, Howard University, and **Najat Ziyadi**, Morgan State University (1067-92-710)

Employment Center

8:00 AM – 7:00 PM   **Preservation Hall, 2nd Floor, Marriott**

AMS Special Session on Quadratic Forms in Algebra and Geometry, I

8:30 AM – 10:50 AM   **Napoleon C2, 3rd Floor, Sheraton**

Organizers: **Jorge F. Morales**, Louisiana State University
Anne Queguiner-Mathieu, Université de Paris 13

8:30AM (207) *Lattices, periodic configurations and Gaussian potential energy.*
Abhinav Kumar*, Massachusetts Institute of Technology, **Henry L Cohn**, Microsoft Research New England, and **Achill Schuermann**, University of Rostock (1067-52-2232)

9:00AM (208) *Improved sphere packing lower bounds from Hurwitz lattices.*
Stephanie Vance, Adams State College (1067-52-728)

9:30AM (209) *Weyl's inequality and systems of quadratic forms.*
Rainer Dietmann, Royal Holloway, University of London (1067-11-1564)

10:00AM (210) *Multi-Variable Period Polynomials Associated to Cusp Forms for $SL_2(\mathbb{Z})$.* Preliminary report.
Oliver Gjoneski, Duke University (1067-22-2273)

10:30AM (211) *Multiplicative properties of integral binary quadratic forms and orders of elements in the form class group.*
Andrew G. Earnest, Southern Illinois University Carbondale (1067-11-1372)

AMS Session on Number Theory, I

8:30 AM – 10:55 AM   **Napoleon D1, 3rd Floor, Sheraton**

8:30AM (212) *The Geyer-Jarden Conjecture in positive characteristic and the degree of torsion points.*
Oscar G. Villareal, Orange, CA (1067-11-2091)

8:45AM (213) *Relations between class numbers of binary cubic forms.*
Jorge Dioses, Oklahoma State University (1067-11-2361)

9:00AM (214) *A property of division points.*
David Grant and **Su-ion Ih***, University of Colorado at Boulder (1067-11-1529)

9:15AM ▶ (215) *Continuation of the Riemann zeta function via derivations.* Preliminary report.
Caleb Emmons, Pacific University (1067-11-614)

9:30AM *Ramanujan Congruence Properties of the*
▶ (216) *Restricted Partition Function* $p(n,m)$.
J. Brandt Kronholm, Saint Mary's College
of Maryland (1067-11-635)

9:45AM *Some congruences connecting values at*
(217) $s = 0$ *of partial zeta functions with units.*
Preliminary report.
Barry R Smith, Lebanon Valley College
(1067-11-1735)

10:00AM *Isometry Classes of Quadratic Forms*
(218) *over* p-*adic Rings.* Preliminary report.
Laura L Steil* and **David Leep**,
University of Kentucky (1067-11-905)

10:15AM *Galois groups of totally and tamely*
(219) *ramified sextic extensions of local fields.*
Chad Awtrey, Elon University
(1067-11-499)

10:30AM *Identities of symmetry for Bernoulli*
(220) *polynomials.*
Dae San Kim* and **Kyoung Ho Park**,
Sogang University (1067-11-221)

10:45AM *A Frobenius Problem for the Ring of*
▶ (221) *Integers in a Number Field.*
Ken Dutch*, Eastern Kentuncky
University, **Peter Johnson**, Auburn
University, **Christopher Maier**, University
of Texas at Dallas, and **Jordan Paschke**,
University of Rochester (1067-11-1171)

AMS Session on Mathematics Education, I

8:30 AM – 10:55 AM **Cornet Room,
8th Floor, Sheraton**

8:30AM *The ALARM Experiment.* Preliminary
▶ (222) report.
Ira Gerhardt, Manhattan College
(1067-97-268)

8:45AM *The Effectiveness of Blended Instruction*
▶ (223) *in Postsecondary General Education*
Mathematics Courses.
Anna E Bargagliotti*, **John Haddock**,
Fernanda Botelho, University of
Memphis, and **Jim Gleason**, University of
Alabama (1067-97-70)

9:00AM *Synopsis of a Program Promoting*
▶ (224) *Mathematics and Science Studies*
among Hispanics and Other Minorities.
Preliminary report.
Juan H Hinojosa, **Firooz Khosraviyani***,
Rohitha Goonatilake and **Rafic A
Bachnak**, Texas A&M International
University (1067-00-2244)

9:15AM *A First Year Experience Seminar.*
(225) **Ximena Catepillan**, Millersville University
of Pennsylvania (1067-00-1673)

9:30AM *The UCLA Applied Math REU Program.*
▶ (226) **Todd Wittman**, UCLA (1067-97-134)

9:45AM *What Can Students Learn from the Dice*
▶ (227) *Game Hog?* Preliminary report.
Deborah E. Seacrest, University of
Nebraska-Lincoln (1067-97-1580)

10:00AM *Integrating Graduate Research into the*
▶ (228) *Middle School Class Room.* Preliminary
report.
Stewart W Hengeveld, Montclair State
University (1067-97-2158)

10:15AM *A Rigorous Reconstruction of Some*
▶ (229) *Concepts in Elementary Algebra for*
Avoiding Misconceptions. Preliminary
report.
Juan J Arellano, Texas A&M International
University (1067-97-2398)

10:30AM *Impact of Automated Proof Systems on*
▶ (230) *Teaching Mathematics.*
Alexander Y Vaninsky, Hostos
Community College of The City University
of New York (1067-97-12)

10:45AM *A New Paradigm in Collaborative*
(231) *Textbook Writing.*
Troy J Siemers*, **Daniel S Joseph** and
Gregory N Hartman, Virginia Military
Institute (1067-97-935)

AMS Session on Logic and Algebraic Systems

8:45 AM – 10:55 AM **La Galerie 5,
2nd Floor, Marriott**

8:45AM *A characterization of computable*
(232) *analysis on unbounded domains using*
differential equations equations.
Kerry Ojakian, Queens College (CUNY)
(1067-03-729)

9:00AM *Comparing the Weak and Strong Omega*
(233) *Coloring Number of Graphs.*
Matthew Anthony Jura, Manhattan
College (1067-03-2275)

9:15AM *Questions of Divisibility in a Group of*
(234) *Density Continuous Functions.*
Michelle Knox, Midwestern State
University (1067-06-542)

9:30AM *Admissible Orders on Quotients of the*
(235) *Free Associative Algebra.*
Jeremiah William Johnson, Penn State
Harrisburg (1067-06-663)

9:45AM *The spaces* $Min(L)$ *and* $Min(L)^{-1}$.
(236) **Papiya Bhattacharjee**, Penn State Erie,
The Behrend College (1067-06-1159)

10:00AM *Real root counting for parametric*
(237) *polynomial systems and applications to*
Maxwell's conjecture.
Ya-lun Tsai, University of
Minnesota-Twin cities (1067-08-859)

10:15AM *J-sets in Commutative and*
(238) *Uncommutative Semigroups.*
John H. Johnson, Howard University
(1067-08-1102)

10:30AM *Cluster Analysis of Heterogeneous Data*
(239) *on Rankings and Flags.* Preliminary
report.
Paige E. Rinker, Dartmouth College
(1067-08-1739)

10:45AM *An Asymptotic Result on the Wilf*
(240) *Conjecture.*
Alex Zhai, Harvard University
(1067-08-1873)

AMS Special Session on Transseries and Ordered Exponential Fields, I

9:00 AM – 10:50 AM   Napoleon B2,
                                      3rd Floor, Sheraton

Organizers: **Gerald A. Edgar**, The Ohio
            State University
            Ovidiu Costin, The Ohio
            State University
            Lou P. van den Dries,
            University of Illinois,
            Urbana-Champaign

9:00AM   *Generalized power series and exponential*
(241)   *real closed fields.* Preliminary report.
         Karen M. Lange* and **Julia F. Knight**,
         University of Notre Dame (1067-03-679)

9:30AM   *Structures associated with real closed*
(242)   *fields.*
         Julia F. Knight* and **Karen Lange**,
         University of Notre Dame (1067-03-669)

10:00AM *Applications of Transseries to the*
(243)   *Geometry of Fractals.*
         Ovidiu Costin, The Ohio State University,
         and **Min Huang***, University of Chicago
         (1067-40-1538)

10:30AM *Transseries, trans-analyticity and*
(244)   *trans-transseries.*
         Ovidiu Costin, Ohio State University
         (1067-40-1626)

MAA Minicourse #4: Part A

9:00 AM – 11:00 AM   Ile de France I,
                                      3rd Floor, JW Marriott

*Getting students involved in
undergraduate research.*
Organizers: **Aparna W. Higgins**,
            University of Dayton
            Joseph A. Gallian,
            University of
            Minnesota-Duluth

MAA Minicourse #7: Part A

9:00 AM – 11:00 AM   Ile de France III,
                                      3rd Floor, JW Marriott

*The mathematics of Islam and its use in
the teaching of mathematics.*
Organizer: **Victor J. Katz**, University of
            the District of Columbia

MAA Minicourse: #8: Part A

9:00 AM – 11:00 AM   Ile de France II,
                                      3rd Floor, JW Marriott

*The ubiquitous Catalan numbers and
their applications.*
Organizer: **Thomas Koshy**,
            Framingham State University

MAA Panel Discussion

9:00 AM – 10:20 AM   La Galerie 6,
                                      2nd Floor, Marriott

*For MAA Student Chapter advisors:
Dynamic answers to your questions.*
Organizers: **Jacqueline Jensen**, Sam
            Houston State University
            Robert W. Vallin, Slippery
            Rock University
            Joyati Debnath, Winona
            State University
Panelists: **Bob Anastasio**, MAA
            Kay Somers, Moravian
            College
            Robert W. Vallin

MAA Committee on the Participation of Women/Women in Mathematics Network Poster Session

9:00 AM – 11:00 AM   Napoleon A1-A3,
                                      3rd Floor, Sheraton

*Mathematical outreach programs for
underrepresented populations.*
Organizer: **Betsy Yanik**, Emporia State
            University

MAA Panel Discussion

9:00 AM – 10:20 AM   La Galerie 2,
                                      2nd Floor, Marriott

*National Science Foundation programs
supporting learning and teaching in the
mathematical sciences.*
Organizers: **Lee Zia**, NSF DUE
            Henry Warchall, NSF DMS
            Dennis Davenport, NSF DUE
            Stephanie Fitchett, NSF DUE

Student Hospitality Center

9:00 AM – 5:00 PM   Gallier Room,
                                      4th Floor, Sheraton

AMS Session on Mathematical Biology and Ecology, I

9:15 AM – 10:55 AM   Rosalie, 3rd
                                      Floor, JW Marriott

9:15AM   *Lattice Gas Cellular Automata modeling*
(245)   *of lineage dynamics and feedback*
         control.
         Shabnam Moobedmehdiabadi,
         University of California, Irvine, CA
         (1067-92-2284)

9:30AM
► (246) *Analysis of Discrete Models of Biological Systems Using Computer Algebra.*
Franziska Hinkelmann*, Virginia Bioinformatics Institute, Virginia Tech, **Madison Brandon**, University of Tennessee - Knoxville, **Bonny Guang**, Harvey Mudd College, **Rustin McNeill**, University of North Carolina, **Alan Veliz-Cuba**, University of Nebraska-Lincoln, **Grigoriy Blekherman**, Institute for Pure and Applied Mathematics, UCLA, and **Reinhard Laubenbacher**, Virginia Bioinformatics Institute, Virginia Tech (1067-92-1486)

9:45AM
► (247) *Stable Tissue Topology and Cell Division in 3D.* Preliminary report.
Michael G Kerckhove, University of Richmond (1067-92-2170)

10:00AM
► (248) *A Categorization of Brazilian Free-Tailed Bat (Tadarida brasiliensis) Chirps.*
Gregory Alan Backus*, Bard College, **Albert Boggess**, **May Boggess**, Texas A&M, and **Kirsten Bohn**, Texas A&M, Department of Biology (1067-92-149)

10:15AM
► (249) *Computational docking of molecular wires to the reaction center of Rhodobacter sphaeroides.* Preliminary report.
Byong Y Kwon, George Mason University (1067-92-1208)

10:30AM
(250) *Utilizing gene pathway-based priors in Bayesian association studies.* Preliminary report.
Abra Brisbin*, Division of Biomedical Statistics and Informatics, Department of Health Sciences Research, Mayo Clinic, **Liewei Wang**, Division of Clinical Pharmacology, Department of Molecular Pharmacology and Experimental Therapeutics, Mayo Clinic, and **Brooke L. Fridley**, Division of Biomedical Statistics and Informatics, Department of Health Sciences Research, Mayo Clinic (1067-92-2030)

10:45AM
(251) *The effect of sampling rate on the statistics of microtubules.* Preliminary report.
Shantia Yarahmadian*, Mississippi State University, and **Sidney L. Shaw**, Indiana University, Department of Biology (1067-92-1434)

MAA Department Liaisons Meeting

9:30 AM – 11:00 AM   Mardi Gras D, 3rd Floor, Marriott

AMS Invited Address

10:05 AM – 10:55 AM   Great Ballroom A-C, 5th Floor, Sheraton

(252) *The symplectic geometry of symmetric products and invariants of 3-manifolds with boundary.*
Denis Auroux, University of California Berkeley (1067-57-8)

AMS-MAA Invited Address

11:10 AM – NOON   Great Ballroom A-C, 5th Floor, Sheraton

► (253) *Curves, surfaces, and solitons.*
Chuu-Lian Terng, University of California at Irvine (1067-53-7)

AMS Colloquium Lectures: Lecture I

1:00 PM – 2:00 PM   Great Ballroom A-C, 5th Floor, Sheraton

► (254) *Expander graphs in pure and applied mathematics, I.* Preliminary report.
Alexander Lubotzky, The Hebrew University of Jerusalem (1067-05-13)

MAA Invited Address

2:15 PM – 3:05 PM   Great Ballroom A-C, 5th Floor, Sheraton

(255) *Laplacian growth and the mystery of the abelian sandpile: A visual tour.*
Yuval Peres, Microsoft Research (1067-A0-38)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, II

2:15 PM – 6:05 PM   Orleans, 3rd Floor, JW Marriott

Organizers: **Darren A. Narayan**, Rochester Institute of Technology
Bernard Brooks, Rochester Institute of Technology
Jobby Jacob, Rochester Institute of Technology
Jacqueline A. Jensen, Sam Houston State University
Carl V. Lutzer, Rochester Institute of Technology

2:15PM
► (256) *The Geometry and Dynamics of an Ecological Arms Race.*
Abigail Fisher*, **Elizabeth Cowdery**, **Michelle Winerip**, **Allison Reed-Harris** and **Jayna Resman**, Smith College (1067-92-1136)

2:45PM *Groups and Change Ringing.* Preliminary
▶ (257) report.
Sarah Costrell*, **Margaret Ewing**,
Jessica Lord and **Viktoria Pardey**, Smith
College (1067-20-1138)

3:15PM *Mathematical modeling of*
▶ (258) *interface-dominated materials*
properties.
Russell J Mahoney* and **Maria G
Emelianenko**, George Mason University
(1067-74-1037)

3:45PM *The Subgraph Summability Number of a*
▶ (259) *Graph.*
Ligo G Richard*, Westminster College,
and **Larson-Koester R Miriam**, Mount
Holyoke College (1067-05-139)

4:15PM *Optimal Ranges for ECG Noise Removal*
▶ (260) *by Using Wavelets.*
Marilyn Manee Smith*, **Megan
Elizabeth Haske** and **Darren Everett
Sowards**, Central Michigan University
(1067-00-143)

4:45PM *A Solution to the Inverse Eigenvalue*
▶ (261) *Problem for 3-by-3 Totally Nonnegative*
Matrices of Class 2.
Robert Fraser*, **Michael C Steward**,
Case Western Reserve University, **Shahla
Nasserasr** and **Charles Johnson**, College
of William and Mary (1067-15-120)

5:15PM *Counting Formulas and Partition Zeta*
▶ (262) *Functions of Atomic Measures.*
Kate E Ellis, California State University,
Stanislaus (1067-28-79)

5:45PM *Continuously Moving Parseval Frames on*
▶ (263) *Smooth Manifolds.* Preliminary report.
Ryan L. Hotovy*, University of Nebraska-
Lincoln, **Eileen R. Martin**, The University
of Texas at Austin, and **Daniel Freeman**,
University of Texas at Austin
(1067-53-124)

AMS-MAA *Special Session on History of Mathematics, II*

2:15 PM – 6:05 PM   **Maurepas, 3rd
Floor, JW Marriott**

Organizers: **Sloan E. Despeaux**, Western
Carolina University

Craig G. Fraser, University
of Toronto

Deborah Kent, Hillsdale
College

2:15PM *Math Needs Paper and Imagination?:*
(264) *Embodying the Mathematical Knowledge*
in 17th century Japan.
Tomoko L Kitagawa, Harvard University
(1067-01-1308)

2:45PM *Early Chinese Mathematics: its*
▶ (265) *Development from pre-Qin to Wei.*
Preliminary report.
Joseph W. Dauben, National Chiao-Tung
University, Taiwan (1067-01-1078)

3:15PM *Chinese Roots of Linear Algebra.*
(266) **Roger Hart**, University of Texas at Austin
(1067-01-1570)

3:45PM *Trigonometric Tables in China.*
▶ (267) **Jiang-Ping Jeff Chen**, St. Cloud State
University, Minnesota (1067-01-132)

4:15PM *The Mathematical Study of Historical*
▶ (268) *Numerical Tables: Successes, Failures,*
Issues.
Glen R Van Brummelen, Quest
University (1067-01-1348)

4:45PM *Diagrams and spheres: reflections on an*
(269) *early Arabic edition of Menelaus'*
Spherics.
Nathan Sidoli, Waseda University
(1067-01-1076)

5:15PM *Ptolemy's justification for the study of*
(270) *mathematics.*
Jacqueline Feke, Stanford University
(1067-01-1575)

5:45PM *Seventeenth-century debates on ratio and*
(271) *proportionality revisited.*
Antoni Malet, Universitat Pompeu Fabra
(1067-01-2423)

AMS-SIAM *Special Session on Mathematics of Computation: Differential Equations, Linear Algebra, and Applications, II*

2:15 PM – 6:05 PM   **Borgne Room,
3rd Floor, Sheraton**

Organizers: **Susanne C. Brenner**,
Louisiana State University

Chi-Wang Shu, Brown
University

2:15PM *Superlinear convergence of MINRES.*
(272) **Valeria Simoncini**, Univeristy of Bologna,
and **Daniel B Szyld***, Temple University
(1067-65-1904)

2:45PM *A Hybridizable Discontinuous*
(273) *Galerkin Method for Steady-State*
Convection-Diffusion-Reaction Problems.
Bernardo Cockburn, University of
Minnesota, **Bo Dong***, Drexel University,
Johnny Guzman, Brown University,
Marco Restelli, Max-Planck-Institut für,
and **Riccardo Sacco**, Politecnico di
Milano (1067-65-1771)

3:15PM *Discontinuous Galerkin Schemes for*
(274) *Vlasov-Poisson Systems.*
Yingda Cheng*, Univeristy of Texas at
Austin, **Irene M Gamba** and **Phillip J
Morrison**, University of Texas at Austin
(1067-65-363)

3:45PM *Applications of recovery techniques in*
(275) *finite element methods.*
Ahmed A. Naga*, Applied Automation
Technologies, Inc., and **Zhimin Zhang**,
Wayne State University (1067-65-652)

4:15PM *Template Matching via l_1 regularization*
(276) *with Application to Hyperspectral*
Imaging.
Zhaohui Guo* and **Stanley Osher**,
University of California, Los Angeles
(1067-49-1080)

4:45PM *Multi-level Algorithms for*
▶ (277) *Infinite-dimensional Integration on $\mathbb{R}^{\mathbb{N}}$.*
Ben Niu*, **Fred J. Hickernell**, Illinois
Institute of Technology, **Klaus**
Ritter, Fachbereich Mathematik,
Technische Universität Darmstadt,
Schloßgartenstr. 7, Darmstadt , Germany,
and **Thomas Müller-Gronbach**,
Universität Passau, Germany
(1067-65-1797)

5:15PM *Fast Spectral Sparse Grid Methods for*
(278) *High Dimensional Non-periodic Problems.*
Haijun Yu* and **Jie Shen**, Purdue
University (1067-65-1681)

5:45PM *Visibility based pursuit-evasion and*
▶ (279) *related control problems.*
Ryo Takei, University of California, Los
Angeles (1067-49-1522)

AMS-SIAM Special Session on Nonlinear Waves and Integrable Systems, II

2:15 PM – 6:05 PM 　　　　Napoleon B1,
3rd Floor, Sheraton

Organizers: **Gino Biondini**, State
University of New York at
Buffalo

Barbara Prinari, University
of Colorado at Colorado
Springs

2:15PM *A Burgers model for striped pattern*
(280) *formation in the strong bending regime.*
Nicholas M Ercolani, University of
Arizona (1067-35-883)

2:45PM *Numerical solution of the*
(281) *Novikov-Veselov equation.*
Ryan Croke, Colorado State University,
Matti J Lassas, University of Helsinki,
Jennifer L Mueller*, Colorado State
University, **Samuli Siltanen**, University
of Helsinki, and **Andreas Stahel**,
Bern University of Applied Sciences
(1067-35-970)

3:15PM *Matrix exponential methods to derive*
(282) *exact solutions of nonlinear evolution*
equations.
Cornelis Van Der Mee* and **Francesco**
Demontis, University of Cagliari
(1067-34-1195)

3:45PM *On classical and radiating strain solitary*
(283) *waves in layered waveguides.*
Karima Khusnutdinova*, Loughborough
University, UK, **Galina Dreiden**,
Alexander Samsonov and **Irina**
Semenova, Ioffe Physical Technical
Institute, Russia (1067-35-723)

4:15PM *Proper Orthogonal Decomposition*
▶ (284) *for Characterizing Nonlinear Wave*
Dynamics in Mode-Locked Lasers.
J. Nathan Kutz, University of Washington
(1067-35-78)

4:45PM *Oblique Shock Waves in Dispersive*
(285) *Eulerian Fluids.*
Mark A. Hoefer, North Carolina State
University (1067-76-822)

5:15PM *Population dynamics models for pulse*
(286) *dynamics in broadband fiber optics*
communication systems.
Avner Peleg* and **Quan Nguyen**, State
University of New York at Buffalo
(1067-35-540)

5:45PM *Linear Stability of Gap Solitons in*
(287) *One-dimensional Periodic Media.*
Guenbo Hwang*, University of Vermont,
Triantaphyllos R Akylas, Massachusetts
Institute of Technology, and **Jianke**
Yang, University of Vermont
(1067-35-1057)

AMS Special Session on Quadratic Forms in Algebra and Geometry, II

2:15 PM – 6:05 PM 　　　　Napoleon C2,
3rd Floor, Sheraton

Organizers: **Jorge F. Morales**, Louisiana
State University

Anne Queguiner-Mathieu,
Université de Paris 13

2:45PM *The gamma filtration and codimension 3*
(288) *cycles on projective homogeneous*
varieties.
Skip Garibaldi*, Emory University, and
Kirill Zainoulline, University of Ottawa
(1067-14-984)

3:15PM *Zero Cycles on Principal Homogeneous*
(289) *Spaces under Semisimple Groups.*
Jodi A. Black, Emory University
(1067-11-959)

3:45PM *Levels and Pythagoras numbers of*
(290) *commutative rings.* Preliminary report.
David B. Leep, University of Kentucky
(1067-11-1282)

4:15PM *The 3-Pfister number of quadratic forms.*
(291) **Mélanie Raczek**, Université Catholique
de Louvain (1067-12-476)

4:45PM *The Graded Witt Group Kernel of*
(292) *Biquadratic Extensions in Characteristic*
Two. Preliminary report.
Bill Jacob*, University of California,
Santa Barbara, and **Roberto Aravire**,
Universidad Arturo Prat (1067-12-757)

5:15PM *Higher dimensional local-global*
(293) *principles.*
David Harbater, University of
Pennsylvania, **Julia Hartmann**, Aachen
University, and **Daniel Krashen***,
University of Georgia (1067-12-2199)

5:45PM (294) *Semiorderings and stability index under field extensions.* Preliminary report.
Karim Johannes Becher, Universität Konstanz, **David B Leep**, University of Kentucky, and **Claus Schubert***, SUNY Cortland (1067-11-524)

AMS Special Session on Mathematical Techniques in Musical Analysis, II

2:15 PM – 6:05 PM Napoleon B3, 3rd Floor, Sheraton

Organizers: **Robert W. Peck**, Louisiana State University

Thomas M. Fiore, University of Michigan at Dearborn

2:15PM (295) *Eine Kleine Mathmusik: Six Mathematical Compositions for Bridges Pécs 2010.*
Rachel Wells Hall, Saint Joseph's University (1067-00-1056)

2:45PM (296) *Fokker's 'Periodicity Blocks', Hellegouarch's 'Natural Scales', and my 'Generated Tone Systems'.*
Marek Zabka, Department of Musicology, Comenius University, Bratislava, Slovakia (1067-20-943)

3:15PM ▶ (297) *The Coin Problem, Central Words, and Guido of Arezzo.*
David L. Clampitt, The Ohio State University (1067-05-688)

3:45PM (298) *Well-formed Scales and Alteration: An Arithmetic Investigation into Music Notation.*
Thomas Noll, Escola Superior de Musica de Catalunya, Barcelona: Departament de Teoria i Composició (1067-20-1040)

4:15PM (299) *Massively all-interval voice-leading structures.*
Jonathan Wild, Schulich School of Music, McGill University (1067-05-792)

4:45PM (300) *The Rational Number System as a Generator of Musical Form.*
Robert Wannamaker, California Institute of the Arts (1067-00-1961)

5:15PM (301) *Topology of Musical Data.*
William A. Sethares, University of Wisconsin, Madison, WI (1067-55-321)

5:45PM (302) *Towards Gestural Music Analysis.*
Guerino Bruno Mazzola, University of Minnesota, School of Music (1067-18-483)

AMS Special Session on Integral Geometry: Analysis and Applications, II

2:15 PM – 6:05 PM Napoleon C3, 3rd Floor, Sheraton

Organizers: **Gaik Ambartsoumian**, University of Texas, Arlington

Gestur Olafsson, Louisiana State University

Eric Todd Quinto, Tufts University

Boris S. Rubin, Louisiana State University

2:15PM (303) *Singular value decomposition for the truncated Hilbert transform.*
Alexander Katsevich, University of Central Florida (1067-44-929)

2:45PM (304) *Local Inversion of the Sonar Transform Regularized by the Approximate Inverse.*
Eric Todd Quinto*, Tufts University, **Andreas Rieder**, Karlsruhe Institute of Technology, and **Thomas Schuster**, Helmut Schmidt Universität (1067-92-187)

3:15PM (305) *Microlocal properties for the slant-hole SPECT operator.*
Raluca Felea*, Rochester Institute of Technology, and **Todd Quinto**, Tufts University (1067-44-432)

3:45PM (306) *Local rigidity results for Riemannian metrics on a manifold with boundary.*
James Vargo, Texas A&M University (1067-53-1335)

4:15PM (307) L^2-*wellposedness for Schrödinger type equations on* $\mathbf{S}^n$. Preliminary report.
Tomoyuki Kakehi, Okayama University (1067-35-2010)

4:45PM (308) *The Admissibility Problem for Radon transforms on projective spaces over finite fields.* Preliminary report.
Eric L Grinberg*, University of Massachusetts, Boston, and **David V. Feldman**, University of New Hampshire (1067-52-1959)

5:15PM ▶ (309) *On simplexes determined by fractal subsets of the Euclidean space.*
Alex Iosevich, University of Rochester (1067-42-417)

5:45PM (310) *Partial Abel Transforms on Damek-Ricci spaces and their application.* Preliminary report.
William O. Bray, University of Maine (1067-42-112)

AMS Special Session on Theory and Application of Stochastic Differential Equations and Stochastic Partial Differential Equations, II

2:15 PM – 6:05 PM Maurepas Room, 3rd Floor, Sheraton

Organizers: **Armando Arciniega**, University of Texas at San Antonio

Edward J. Allen, Texas Tech University

Sivapragasam Sathananthan, Tennessee State University

Mahmoud Anabtawi, American University of Sharjah

2:15PM *Immortal Particle for a Catalytic*
(311) *Branching Process.*
Min Kang, North Carolina State
University (1067-60-467)

2:45PM *Hybrid network dynamic inequalities*
(312) *under hereditary and random*
perturbations. Preliminary report.
Gangaram S Ladde, University of South
Florida (1067-60-1941)

3:15PM *On a class of abstract*
(313) *measure-dependent stochastic evolution*
equations. Preliminary report.
Mark A McKibben, Goucher College
(1067-60-360)

3:45PM *Generalized Random Differential*
(314) *Inequalities and Applications.* Preliminary
report.
Jinghan Meng* and **Gangaram S
Ladde**, University of South Florida
(1067-60-1980)

4:15PM *Dynamic Modeling of Network*
(315) *Externality.* Preliminary report.
Arnut Paothong* and **Gangaram S
Ladde**, University of South Florida
(1067-62-1011)

4:45PM *Machine learning methods in Finance.*
(316) Preliminary report.
Kandethody M Ramachandran,
University of South Florida
(1067-60-1978)

5:15PM *Stochastic models for heat flow in a*
▶ (317) *cylinder.* Preliminary report.
Edward W. Swim*, Sam Houston State
University, and **Mark P. Adams**, United
States Army (1067-65-2038)

5:45PM *On Optimal Harvesting Problems in*
(318) *Random Environments.*
Qingshuo Song, City University of Hong
Kong, **Richard Stockbridge** and **Chao
Zhu***, University of Wisconsin-Milwaukee
(1067-60-409)

AMS Special Session on Analytic and Geometric Methods in Representation Theory, II

2:15 PM – 6:05 PM   Conde, 3rd Floor, JW Marriott

Organizers: **Leticia Barchini**, Oklahoma
State University
Hongyu He, Louisiana State
University

2:15PM *Eigenspace representations for*
(319) *homogeneous spaces.*
Sigurdur Helgason, MIT (1067-22-323)

3:15PM *The Belkale-Kumar cup product and*
(320) *relative Lie algebra cohomology.*
William Graham*, University of Georgia,
and **Sam Evens**, University of Notre
Dame (1067-22-1929)

3:45PM *A realization of an irreducible unitary*
(321) *representation.*
Juhyung Lee, Oklahoma State University
(1067-22-1242)

4:15PM *Geometric models for the spectra of*
(322) *certain Gelfand pairs associated with*
Heisenberg groups.
Gail Ratcliff* and **Chal Benson**, East
Carolina University (1067-43-813)

4:45PM *Equivariant Cohomology Class Formulas*
(323) *for K-Orbit Closures in the Flag Variety.*
Preliminary report.
Benjamin J Wyser, University of Georgia
(1067-14-2105)

5:15PM *Ramanujan's master theorem for*
(324) *symmetric spaces.*
Gestur Olafsson*, Louisiana State
University, and **Angela Pasquale**,
Univeristy of Metz, France (1067-22-909)

5:45PM *Square integrable harmonic spinors.*
(325) Preliminary report.
Roger Zierau* and **Leticia Barchini**,
Mathematics Department, Oklahoma
State University (1067-22-1295)

AMS Special Session on Geometric Group Theory, II

2:15 PM – 6:05 PM   Napoleon C1,
3rd Floor, Sheraton

Organizers: **Joshua B. Barnard**,
University of South Alabama
Pallavi Dani, Louisiana State
University

2:15PM *On (co)homological characterizations of*
(326) *exact groups.*
Jacek Brodzki, **Graham A. Niblo**,
University of Southampton, **Piotr W.
Nowak***, Texas A&M University, and **Nick
J. Wright**, University of Southampton
(1067-20-370)

2:45PM *Reduced 1-cohomology and relative (T).*
(327) **Talia Fernos***, Hebrew University of
Jerusalem and University of North
Carolina at Greensboro, and **Alain
Valette**, Universite de Neuchatel
(1067-20-2422)

3:15PM *Extremality of the rotation*
(328) *quasimorphism on the modular group.*
Preliminary report.
Joel Louwsma, California Institute of
Technology (1067-57-1530)

3:45PM *Stable commutator length and maps*
(329) *from bounded surfaces to closed*
surfaces.
Matthew B. Day, California Institute of
Technology (1067-57-682)

4:15PM *What is a cross ratio?*
(330) **Francois Labourie**, Universite Paris-Sud,
Orsay (1067-51-1350)

4:45PM *Hyperplane arrangements in negatively*
(331) *curved manifolds and relative*
hyperbolicity.
Igor Belegradek, Georgia
Institute of Technology, and **G.
Christopher Hruska***, University of
Wisconsin–Milwaukee (1067-20-2414)

5:15PM (332) *Local Quasiconvexity of Groups acting on Small Cancellation Complexes.*
Eduardo Martínez-Pedroza*, McMaster University, and **Daniel T. Wise**, McGill University (1067-20-563)

5:45PM (333) *Conjugacy classes of solutions to systems of equations over hyperbolic groups.*
Daniel Groves*, University of Illinois at Chicago, and **Henry Wilton**, California Institute of Technology (1067-20-1392)

AMS Special Session on Computational Algebraic and Analytic Geometry for Low-Dimensional Varieties, II

2:15 PM – 6:05 PM   Napoleon D2, 3rd Floor, Sheraton

Organizers: **Mika K. Seppala**, Florida State University
Tanush Shaskas, Oakland University
Emil Volcheck, National Security Agency

2:15PM (334) *Rational curves on cubic hypersurfaces.*
Izzet Coskun*, University of Illinois at Chicago, and **Jason Starr**, SUNY Stony Brook (1067-14-1220)

2:45PM (335) *Existence and computation of rational general solutions of parametrizable ODEs.*
Franz Winkler, RISC, J. Kepler University Linz, Austria (1067-14-573)

3:15PM (336) *Computations in Cubic Function Fields of Characteristic Three.*
Jonathan Webster, Bates College (1067-11-726)

3:45PM (337) *The arithmetic of genus two curves.*
Lubjana Beshaj*, University of Vlora, Vlora, Albania, and **Tanush Shaska**, Oakland University (1067-14-810)

4:15PM (338) ▶ *The Inverse Galois Problem with minimal ramification over function fields.*
Nigel Boston and **Meghan De Witt***, University of Wisconsin-Madison (1067-12-1991)

4:45PM (339) *Isotopic Approximations of Singular Algebraic Curves.*
Michael A Burr*, Fordham University, **Sung Woo Choi**, Duksung Women's University, **Ben Galehouse**, Max-Planck-Institut für Informatik, and **Chee K Yap**, Courant Institute, NYU (1067-14-2129)

5:15PM (340) *Class Number and Regulator Computation in Purely Cubic Function Fields of Unit Rank Two.*
Eric J Landquist*, Kutztown University, **Felix Fontein** and **Renate Scheidler**, University of Calgary (1067-11-1939)

5:45PM (341) *Ideals of curves given by points.*
Elisabetta Fortuna, **Patrizia Gianni**, University of Pisa, and **Barry M Trager***, IBM T.J.Watson Research Center (1067-14-2271)

AMS Special Session on Mathematical Modeling in Environmental Economics, II

2:15 PM – 5:00 PM   Napoleon D3, 3rd Floor, Sheraton

Organizers: **Natali Hritonenko**, Prairie View A&M University
Yuri Yatsenko, Houston Baptist University

2:15PM (342) ▶ *Modeling a Carbon Market Using an Engineering Approach: Blue Chips Turning Green.*
Steven A Bleiler*, Portland State University, **Yoko Nagase**, Oxford Brookes University, and **Thomas Fielden**, Portland State University (1067-90-1389)

3:15PM (343) *Modeling of the optimal economic response to environmental adaptation.*
Yuri Yatsenko, School of Business, Houston Baptist University (1067-90-641)

4:15PM (344) *Undergraduate research examples on Mathematical Modeling in Environmental Economics.*
Kaibin Fu, Prairie View A&M University (1067-92-1268)

4:45PM (345) *Some hyperbolic equations arising in mathematical cosmology.*
Anahit Galstyan, University of Texas-Pan American (1067-35-2182)

AMS Special Session on Interactions of Inverse Problems, Signal Processing, and Imaging, I

2:15 PM – 6:05 PM   Frontenac, 3rd Floor, JW Marriott

Organizer: **Zuhair Nashed**, University of Central Florida

2:15PM (346) *Quantitative photoacoustics and other hybrid inverse problems.*
Guillaume Bal, Columbia University (1067-35-1726)

2:45PM (347) *Compressive imaging by the MUSIC algorithm.*
Albert Fannjiang, UC Davis (1067-68-278)

3:15PM (348) *Inverse scattering via near-field imaging.* Preliminary report.
Gang Bao*, Zhejiang University and Michigan State University, and **Junshan Lin**, Michigan State University (1067-78-1198)

3:45PM (349) ▶ *Satellite Gravity Gradiometry (SGG).*
Willi Freeden, University of Kaiserslautern (1067-86-2429)

4:15PM (350) *Identification of interfaces using the pressure parts (or the shear parts) of the elastic waves.*
Drossos Gintides, National Technical University of Athens, and **Mourad Sini***, RICAM, Austrian Academy of Sciences (1067-35-342)

4:45PM *Shape Reconstruction based on Integral*
(351) *Invariants: Theory and Applications.*
Thomas Fidler, Computational Science
Center, University of Vienna, Austria
(1067-65-1197)

5:15PM *Generalized local regularization of linear*
(352) *inverse problems, with application*
to Volterra problems in L^p-spaces.
Preliminary report.
Cara D. Brooks* and **Patricia K. Lamm**,
Michigan State University (1067-45-1775)

5:45PM *Image and Data Fusion.*
▶ (353) **Todd Wittman**, UCLA (1067-94-2177)

MAA Minicourse #11: Part A

2:15 PM – 4:15 PM   **Ile de France III,**
3rd Floor, JW Marriott

Using video case studies in teaching a
proof-based gateway course to the
mathematics major.

Organizers: **James T. Sandefur**,
Georgetown University

Connie M. Campbell,
Milllsaps College

Kay Somers, Moravian
College

MAA Minicourse #2: Part A

2:15 PM – 4:15 PM   **Ile de France I,**
3rd Floor, JW Marriott

Getting mathematics majors to think
outside the book: Course activities
that promote exploration, discovery,
conjecture, and proof.

Organizers: **Suzanne Dorée**, Augsburg
College

Jill Dietz, St. Olaf College

Brian P. Hopkins, St. Peter's
College

MAA Minicourse #9: Part A

2:15 PM – 4:15 PM   **Ile de France II,**
3rd Floor, JW Marriott

Learning discrete mathematics via
historical projects.

Organizers: **Jerry M. Lodder**, New
Mexico State University

Guran Bezhanishvili, New
Mexico State University

David J. Pengelley, New
Mexico State University

Janet H. Barnett, Colorado
State University, Pueblo

AMS Session on Statistics

2:15 PM – 5:55 PM   **Balcony N, 4th Floor, Marriott**

2:15PM *Supporting Women in STEM fields: The*
▶ (354) *Wi^2STEM Club"s Impact on Student*
Members at Clayton State University.
Preliminary report.
Michelle York*, **Catherine Matos** and
Mary Hudachek-Buswell, Clayton State
University (1067-62-2280)

2:30PM *Fair Regulation and Calculation Of Scores*
(355) *In Competitions Involving Judges'*
assessment.
Chengyu Liu*, University of
Wisconsin-Madison, and **Wei Pan**, Capital
Medical University (1067-62-1875)

2:45PM *Applying Recurrent Event Survival*
(356) *Analysis on China One child one family*
policy. Preliminary report.
Boubakari Ibrahimou, Western Kentucky
University (1067-62-1155)

3:00PM *A Poisson Approximation for the Number*
▶ (357) *of kl-Matches II.* Preliminary report.
Michael Donders*, McDaniel College,
Katherine Grzesik, SUNY Oswego,
Chelsea Ross, East Tennessee State
University, and **Heather Shappell**,
Arcadia University (1067-62-1774)

3:15PM *The Power Cauchy Distribution:*
▶ (358) *Derivation, Description, and Composite*
Models.
Brian T Rooks*, University of North
Carolina Chapel Hill, and **Amy C
Schumacher**, Birmingham-Southern
College (1067-62-170)

3:30PM *Zero Inflated Exponential Distribution.*
(359) **Sougata Dhar** and **Santanu
Chakraborty***, University of Texas - Pan
American (1067-62-595)

3:45PM *Optimal designs for rational function*
(360) *regression.*
David Papp, Rutgers University
(1067-62-1111)

4:00PM *Preliminary Report on the Power of the*
(361) *Bootstrap Ratio Test for Normality.*
Maria E. Calzada and **Holly M. Gardner***,
Loyola University New Orleans
(1067-62-1144)

4:15PM *Characterizations of t-distribution via*
▶ (362) *conditional expectations of order*
statistics.
George P Yanev*, The University
of Texas - Pan American, and **M
Ahsanullah**, Rider University
(1067-62-1167)

4:30PM *Tail Dependence Density of Vine copulas.*
(363) **Peiling Wu**, Math Department
of Washington State University
(1067-62-1384)

4:45PM *Increased Adaptivity in Smoothed*
(364) *Polynomial Histograms with Application*
to Massive and Pre-Binned Datasets.
Galen I Papkov, Florida Gulf Coast
University (1067-62-1418)

5:00PM *Estimating Variance-Mean Mixtures of*
▶ (365) *Normals.*
Hasan Hamdan, **Ling Xu**, James
Madison University, **Holly Gardner**,
Loyola University New Orleans, **Sam
Helmich**, Winona State University, **Caitlin
Steiner***, College of William & Mary, and
Kevin Stoll, Baldwin-Wallace College
(1067-62-1492)

5:15PM *The Joint Distribution of Surplus*
(366) *Immediately Before Ruin And The Deficit
at Ruin Under Interest Force.* Preliminary
report.
Kumer Pial Das* and **Md. Shamim
Sarker**, Lamar University (1067-62-2185)

5:30PM *A novel Algorithm for ellipse fitting.*
(367) Preliminary report.
Ali A Al-Sharadqah, University of
Alabama at Birmingham (1067-62-719)

5:45PM *On the Comparison of One Stage and*
▶ (368) *Two Stage Selection Procedures in Bayes
Approach.* Preliminary report.
Jin Tan, University of Illinois at Chicago
(1067-62-1657)

AMS Session on Topics in Algebra

2:15 PM – 6:10 PM   La Galerie 5,
                              2nd Floor, Marriott

2:15PM *The Invariance and the General*
(369) *Cohomology Comparison Theorems.*
Alin Stancu, Columbus State University
(1067-18-1719)

2:30PM *An approach to the stable derived*
(370) *category via model categories.*
Preliminary report.
Daniel Bravo, Wesleyan University
(1067-18-866)

2:45PM *Lower Algebraic K-theory of virtually free*
(371) *groups.*
Seshendra Pallekonda, King's College,
PA (1067-19-1288)

3:00PM *Combining Triple Diagonal Forms.*
(372) **Edward Eugene Rehkopf**, University of
Southern Indiana (1067-15-1997)

3:15PM *Determinants of sum of orbits under*
(373) *compact Lie group.*
Mary Clair Thompson* and **Tin-Yau
Tam**, Auburn University (1067-15-2040)

3:30PM *The cprank and rank of a completely*
▶ (374) *positive matrix.* Preliminary report.
Wasin So*, San Jose State University, and
Changqing Xu, Zhejiang A&F University
(1067-15-506)

3:45PM *Solution Theory for Bilinear Systems of*
▶ (375) *Equations.*
Dian Yang, College of William and Mary
(1067-15-182)

4:00PM *Spectral Analysis of Non-Hermitian*
▶ (376) *Matrices.*
Philip V Vu*, Williams College, and
Matthew Coudron, University of
Minnesota (1067-15-387)

4:15PM *The Energy of Graphs.*
▶ (377) **Audrey Margaret Hubbard***, Ave Maria
University, and **Christian Matthew
Woods**, University of Pittsburgh
(1067-15-155)

4:30PM *Euclidean Squared Distance Matrices.*
(378) Preliminary report.
Thomas Milligan, University of Central
Oklahoma (1067-15-2062)

4:45PM *Numerical stability of an algorithm for*
(379) *the complete CS decomposition.*
Brian D. Sutton, Randolph-Macon
College (1067-15-2209)

5:00PM *Behavior of Ritz Values for Normal*
▶ (380) *Matrices and Jordan Blocks.* Preliminary
report.
Russell L Carden*, **Mark Embree**
and **Derek Hansen**, Rice University
(1067-15-1712)

5:15PM *Computation of zero forcing number for*
▶ (381) *some families of graphs.* Preliminary
report.
Darren D. Row, Iowa State University
(1067-15-1303)

5:30PM *A Monte Carlo Algorithm for Computing*
▶ (382) *Dot Products with Application to
Information Retrieval.*
Sylvester David Eriksson-Bique,
University of Helsinki, **Mary Katherine
Solbrig***, Reed College, **Michael
Stefanelli**, College of New Jersey, **Sarah
Warkentin**, Harvey Mudd College, **Ralph
Abbey** and **Ilse Ipsen**, North Carolina
State University (1067-15-472)

5:45PM *Applying Simon-Ando Theory to Data*
▶ (383) *Clustering.*
Charles D. Wessell* and **Carl D.
Meyer**, North Carolina State University
(1067-15-553)

6:00PM *Multilinear Algebra and Tensors.*
▶ (384) Preliminary report.
William R Henderson*, **Jeffrey M
Wyman**, **Carla D Martin**, James Madison
University, and **Misha E Kilmer**, Tufts
University (1067-15-54)

AMS Session on Number Theory, II

2:15 PM – 5:40 PM   Napoleon D1,
                              3rd Floor, Sheraton

2:15PM *Study of Polynomial Solutions to Certain*
(385) *Diophantine Equations.*
Emel Demirel* and **Aihua Li**, Montclair
State University (1067-97-739)

2:30PM *On Somos' dissection identities.*
(386) **Zhu Cao**, University of Mississippi
(1067-11-2334)

2:45PM *Higher order spt-functions.*
(387) **F. G. Garvan**, University of Florida
(1067-11-2000)

3:00PM *On the transcendence of Fourier and*
▶ (388) *other infinite series.*
Chester J Weatherby, University of
Delaware (1067-11-2299)

3:15PM *Limiting structure for some central*
(389) *binomial evaluations.*
John R. Greene, University of Minnesota
Duluth (1067-11-938)

3:30PM *The k-Zeckendorf Array.*
(390) **Curtis N Cooper**, University of Central
Missouri (1067-11-1277)

3:45PM *Enumeration of Triangles in Rational*
▶ (391) *Residue Graphs.*
Mark Budden, Western Carolina
University, **Nicole Calkins**, **William
Nathan Hack**, **Joshua K Lambert** and
Kimberly Thompson*, Armstrong
Atlantic State University (1067-11-1528)

4:00PM *Enumeration of Triangles in Quartic*
▶ (392) *Residue Graphs.*
Mark Budden, Western Carolina
University, **Nicole Calkins***, **William
Nathan Hack**, **Joshua K Lambert** and
Kimberly Thompson, Armstrong
Atlantic State University (1067-11-1029)

4:15PM *A connection between Hopf orders and*
(393) *Laurent series.* Preliminary report.
Alan Koch, Agnes Scott College
(1067-11-1987)

4:30PM *Random Additive 3-Bases & Sum-free*
▶ (394) *Sets.* Preliminary report.
Chang Mou Lim*, Yale University,
and **Nicholas George Triantafillou**,
University of Michigan, Ann Arbor
(1067-11-1872)

4:45PM *On Nathanson's problem in number*
(395) *theory and geometric group theory.*
Krishanu Roy Sankar, Massachusetts
Institute of Technology (1067-11-1094)

5:00PM *Lipschitz Bounds for Rational Functions*
(396) *De fined over the Berkovick Projective
Line over an Algebraically Closed and
Complete Non-Archimedean Field.*
Preliminary report.
Stephen Edward Winburn, University of
Georgia (1067-11-1718)

5:15PM *EZADS Inputs which Produce*
(397) *Half-Factorial Block Monoids.*
Jeffrey A Manning, California Institute of
Technology (1067-11-1074)

5:30PM *A Note on the Power Subgroups of the*
(398) *Modular Group.*
Omer Yayenie, Murray State University
(1067-11-362)

AMS Session on Mathematics Education, II

2:15 PM – 3:55 PM   **Cornet Room,
                                     8th Floor, Sheraton**

2:15PM *Items for Assessment of Mathematical*
(399) *Content Knowledge for Secondary
Teachers.*
Hugo Rossi, University of Utah
(1067-97-1252)

2:30PM *Prospective Teachers' Self-assessment*
▶ (400) *Based on Reflective Writing Assignments
in a Pre-service Math Course.* Preliminary
report.
James R. Valles Jr* and **Rebecca Ortiz**,
Texas Tech University (1067-97-175)

2:45PM *Numerical Reasoning: An Inquiry-Based*
▶ (401) *Course for K-8 Teachers.*
Rachel Cochran, **Jason Fulmore**, Center
for Educational Accountability, **John C.
Mayer**, University of Alabama at
Birmingham, and **Bernadette Mullins***,
Birmingham-Southern College
(1067-97-1768)

3:00PM *Connecting Mathematics Learning with*
▶ (402) *Teaching.*
Virginia L. Keen, University of Dayton
(1067-97-1557)

3:15PM *Teaching Mathematics in the*
(403) *Technological Classroom: Teachers Do,
Technology Doesn't.* Preliminary report.
Robert G Page, Framingham State
University (1067-97-1967)

3:30PM *An Electronic Classroom Model for*
▶ (404) *Mathematics Content Courses.*
Brooke E Evans* and **Patricia McKenna**,
Metropolitan State College of Denver
(1067-97-2365)

3:45PM *Aligning middle and high school*
▶ (405) *teachers' teaching to new algebra trends
in California.* Preliminary report.
Imre Tuba* and **Jeff Burt**, San Diego
State University, Imperial Valley
(1067-97-2400)

AMS Session on Combinatorics and Graph Theory, III

2:15 PM – 6:10 PM   **Southdown Room,
                                     4th Floor, Sheraton**

2:15PM *Maximal minimal k-rankings of*
(406) *caterpillar trees and cycles.*
Lauren R. McGough, MIT (1067-05-2049)

2:30PM *The Set Chromatic Number of a Directed*
▶ (407) *Graph.* Preliminary report.
J Larry Langley* and **K Sarah Merz**,
University of the Pacific (1067-05-1351)

2:45PM *Conflict free coloring of (simple)*
(408) *hypergraphs with few edges.*
Mohit Kumbhat*, **A Kostochka**,
University of Illinois, Urbana-Champaign,
and **T Luczak**, Emory University
(1067-05-607)

3:00PM *On graph labelings and cyclic G-designs.*
▶ (409) **Ryan C Bunge***, Illinois State University,
Avapa Chantasartrassmee, University of
the Thai Chamber of Commerce, **Saad
El-Zanati** and **Charles Vanden Eynden**,
Illinois State University (1067-05-2201)

3:15PM *On Rosa-Type Labelings of 3-regular*
▶ (410) *Graphs.*
Wannasiri Wannasit*, Chiang Mai
University, and **Saad El-Zanati**, Illinois
State University (1067-05-2213)

3:30PM *Modular Edge-Graceful Graphs.*
(411) **Futaba Fujie-Okamoto**, University of Wisconsin La Crosse (1067-05-1495)

3:45PM *Hall m-completable graphs.* Preliminary
(412) report.
Sibel Ozkan, Michigan Technological University, and **Erik E Westlund***, University of Wisconsin-Marshfield/Wood County (1067-05-1651)

4:00PM *Planarized Pascal's triangle mod a*
▶ (413) *general prime p graphs and their Properties.*
Heather M. Shappell*, Arcadia University, **Katherine Grzesik**, SUNY Oswego, and **Mike Donders**, McDaniel College (1067-05-1723)

4:15PM *Graph Labeling with Distance-Two*
▶ (414) *Constraints.*
Jobby Jacob, Rochester Institute of Technology (1067-05-2261)

4:30PM *On the λ-numbers of subclasses of*
(415) *generalized Petersen graphs.*
Sarah Spence Adams, **Paul Booth***, **Harold Jaffe**, Franklin W. Olin College of Engineering, **Denise Sakai Troxell**, Babson College, and **Steven Luke Zinnen**, Franklin Olin College of Engineering (1067-05-2058)

4:45PM *Dynamic Monopolies and k-Conversion*
(416) *Sets in Graph Products and Triangular Grids: Modeling the Spread of Fault in Distributed Network Systems.*
Sarah Spence Adams, **Zachary Brass**, **Connor Stokes***, Franklin W. Olin College of Engineering, **Denise Sakai Troxell**, Babson College, and **Steven Luke Zinnen**, Franklin W. Olin College of Engineering (1067-05-2103)

5:00PM *On-line Degree Ramsey Numbers:*
(417) *Building and Painting Graphs, One Edge at a Time.*
David S. Rolnick, Massachusetts Institute of Technology (1067-05-2342)

5:15PM *Zero Forcing Sets and Bipartite*
▶ (418) *Circulants.* Preliminary report.
Seth A. Meyer, University of Wisconsin - Madison (1067-05-2134)

5:30PM *On a (p, q)-edge coloring of K_n.*
▶ (419) **Zachary Kudlak***, Mount Saint Mary College, and **Luboš Thoma**, University of Rhode Island (1067-05-1738)

5:45PM *Almost-rainbow edge-colorings of some*
(420) *small subgraphs.*
Elliot J Krop*, Clayton State University, and **Irina Krop**, DePaul University (1067-05-1316)

6:00PM *Max-optimal and sum-optimal labelings*
▶ (421) *of graphs.*
Darren A. Narayan*, Rochester Institute of Technology, and **Robert Jamison**, Clemson University and The University of Haifa (1067-05-1270)

AMS Session on Combinatorics and Graph Theory, IV

2:15 PM – 6:10 PM   **Bayside B, 4th Floor, Sheraton**

2:15PM *Monochromatic sums equal to products*
(422) *in $\mathbb{N}$.*
Neil Hindman, Howard University (1067-05-587)

2:30PM *Poset-Free Families in Boolean Lattices.*
▶ (423) **Wei-Tian Li**, University of South Carolina (1067-05-1499)

2:45PM *Order in the Conjugacy Decomposition of*
▶ (424) *the Rook Monoid.* Preliminary report.
Ryan K Therkelsen, Bellarmine University (1067-05-805)

3:00PM *Resistance analysis of infinite networks.*
(425) **Palle E. T. Jorgensen**, U. Iowa, and **Erin P. J. Pearse***, U. Oklahoma (1067-05-1733)

3:15PM *Efficient Domination of Tessellations*
▶ (426) *and other Infinite Graphs with Extra Symmetry.* Preliminary report.
Katie Rose Banks*, Harvard University, and **Chang Mou Lim**, Yale University (1067-05-1414)

3:30PM *On Universal Cycles for new Classes of*
▶ (427) *Combinatorial Structures.* Preliminary report.
Antonio Blanca, Georgia Institute of Techonology (1067-05-1104)

3:45PM *Omnimosaics.* Preliminary report.
▶ (428) **Nicholas George Triantafillou***, University of Michigan - Ann Arbor, and **Katie R. Banks**, Harvard University (1067-05-964)

4:00PM *The Probability of an Even Number of*
▶ (429) *Hills among Generalized Dyck Paths.* Preliminary report.
Naiomi T. Cameron, Lewis & Clark College (1067-05-703)

4:15PM *Extraordinary Subsets of $1, 2, 3, \ldots, n$.*
▶ (430) **Ralph P. Grimaldi**, Rose-Hulman Institute of Technology (1067-05-850)

4:30PM *A Wilf-Zeilberger Approach to Sums of*
▶ (431) *Choi, Zornig and Rathie.*
Samantha Dahlberg, Michigan State University, **Timothy Ferdinands**, University of Notre Dame, and **Akalu Tefera***, Grand Valley State University (1067-05-1179)

4:45PM *A Generalization of Algorithm-Z with*
▶ (432) *Application.* Preliminary report.
Ae Ja Yee and **Kagan Kursungoz***, The Pennsylvania State University (1067-05-1408)

5:00PM *A recursive Construction of Non-binary*
▶ (433) *de Bruijn Sequences.*
Abbas Mahdi Alhakim*, American University of Beirut, and **Mufutau B Akinwande**, Clarkson University (1067-05-1447)

5:15PM ► (434) *A Nim-type game played on the complete graph.*
Lindsay Anne Merchant, North Dakota State University (1067-05-123)

5:30PM (435) *Winning strategy for Chomp Grid with 0, 1, 2, or 3 pieces in the 3rd row.*
Crystal L. Bennett*, North Carolina Agricultural & Technical State University, **Joshua Chukwuka**, Morgan State University, and **Kenneth Berg**, University of Maryland (1067-05-2277)

5:45PM (436) *The 2-adic valuation of the complementary Bell numbers.*
Valerio De Angelis*, Xavier University of Louisiana, **Victor H Moll** and **Tewodros Amdeberhan**, Tulane University (1067-05-1614)

6:00PM ► (437) *Sequences of matchings.* Preliminary report.
Sarah H Holliday, Southern Polytechnic State University (1067-05-1745)

MAA Session on Cryptology for Undergraduates

2:15 PM – 6:10 PM   **Great Ballroom E, 5th Floor, Sheraton**

Organizers: **Robert Edward Lewand**, Goucher College

Chris Christensen, Northern Kentucky University

2:15PM ► (438) *Algebraic Cryptanalysis as a tool for teaching Cryptology.*
Daniel Cabarcas, University of Cincinnati (1067-C5-706)

2:35PM ► (439) *Cryptography Tools: A Teaching Tool for the Investigation of Classical Cryptography and Cryptanalysis.*
Don Spickler, Salisbury University (1067-C5-811)

2:55PM ► (440) *Group Signature Schemes: How to share a secret without telling it.*
Cheryl L. Beaver, Western Oregon University (1067-C5-2202)

3:15PM (441) *Cryptography, a Great Topic for Undergraduate Mathematics Courses.*
Aihua Li, Montclair State University (1067-C5-1942)

3:35PM ► (442) *A Cryptology Course for the Non-Mathematician.*
Todd Feil, Denison University (1067-C5-446)

3:55PM ► (443) *A Brief Fly-Through of Cryptology for First-Semester Students using Active Learning and Common Technology.*
Robert Talbert, Franklin College (1067-C5-2059)

4:15PM ► (444) *A first-year seminar in cryptology.*
Robert A Beezer, University of Puget Sound (1067-C5-1428)

4:35PM ► (445) *Student Codebooks: An in-depth writing assignment.*
Stuart Boersma, Central Washington University (1067-C5-543)

4:55PM ► (446) *Codes in History, the Arts, and Literature.*
Kay E. Smith, Saint Olaf College (1067-C5-1192)

5:15PM ► (447) *Making Cryptography Come Alive.*
Kristi Meyer, Wisconsin Lutheran College (1067-C5-1315)

5:35PM (448) *Using Cryptography to Show Students that Math is Everywhere.* Preliminary report.
Mike May, Saint Louis University (1067-C5-1356)

5:55PM ► (449) *How to Construct a Spy Dossier.*
Peter J. Littig, University of Washington, Bothell (1067-C5-1816)

MAA Session on The Mathematics of Games and Puzzles, I

2:15 PM – 6:10 PM   **Grand Chenier Room, 5th Floor, Sheraton**

Organizers: **Laura Taalman**, James Madison University

Robin L. Blankenship, Morehead State University

2:15PM (450) *Twist Untangle and its Discontents.*
Sandy Ganzell, **Alex Meadows***, St. Mary's College of Maryland, and **John Ross**, Johns Hopkins University (1067-P1-1784)

2:35PM ► (451) *Counting the Number of Hextile Knot Mosaics in a Diagram with Fixed Center and Radius.* Preliminary report.
Robin Leigh Blankenship*, **Michael Blankenship**, Morehead State University, and **Craig Hamilton**, University of Kentucky and Morehead State University (1067-P1-2340)

2:55PM ► (452) *Chessboard problems peppered with pawns.* Preliminary report.
Doug Chatham, Morehead State University (1067-P1-826)

3:15PM (453) *Discovering the Art of Mathematics: Straight-Cut Origami.*
Christine von Renesse* and **Volker Ecke**, Westfield State University (1067-P1-1892)

3:35PM ► (454) *Tropical determinants and cheating when solving the Rubik's cube.*
Thomas J Dinitz*, Colgate University, **Matthew Hartman**, Xavier University, and **Jenya Soprunova**, Kent State University (1067-P1-642)

3:55PM ► (455) *The 36Cube Puzzle.*
W D Wallis, Southern Illinois University, Carbondale, IL. (1067-P1-322)

4:15PM ► (456) *The minimal number of entries of a solvable Ken Ken.*
Philip Cobb, Queensborough Community College (1067-P1-886)

4:35PM ► (457) *On the Use of Fractional Matchings to Find Pairing Strategy Draws in N^d Tic-Tac-Toe.* **Klay T Kruczek**, Western Oregon University (1067-P1-770)

4:55PM ► (458) *Tic-Tac-Toe with Eeny, Meeny, Miny, Moe.* **Dennis P. Walsh**, Middle Tennessee State University (1067-P1-2306)

5:15PM (459) *A Winning Strategy for Tic-Tac-Toe on an Affine Plane of Order 4.* **Matthew P Conlen*** and **Juraj Milcak**, The Fields Institute (1067-P1-2376)

5:35PM ► (460) *"Fire and Ice".* **Mary J. Riegel**, The University of Montana (1067-P1-1644)

5:55PM ► (461) *Using SET® to Visualize AG(4,3).* **Elizabeth W McMahon***, Lafayette College, and **Kyle Kalail**, Hastings College (1067-P1-1024)

MAA Session on Getting Students Involved in Writing Proofs

2:15 PM – 6:30 PM **Grand Couteau Room, 5th Floor, Sheraton**

Organizers: **Aliza Steurer**, Dominican University

Jennifer Franko-Vasquez, University of Scranton

Rachel Schwell, Central Connecticut State University

2:15PM ► (462) *On peer grading to improve proof writing.* **Xuan Hien Nguyen*** and **Andrew Bennett**, Kansas State University (1067-G1-1579)

2:35PM ► (463) *From Evaluating Proofs to Constructing Proofs.* Preliminary report. **Kyeong Hah Roh**, Arizona State University (1067-G1-2239)

2:55PM ► (464) *(How) Can We Teach Proofs? A Classical Approach.* **Bernd S. W. Schroeder**, Louisiana Tech University (1067-G1-309)

3:15PM ► (465) *A Group Project.* **Mary K Flagg**, University of Houston (1067-G1-456)

3:35PM ► (466) *Using Bluetooth Technology in a Proof Writing Course.* Preliminary report. **Firas Y Hindeleh**, Grand Valley State University (1067-G1-668)

3:55PM ► (467) *Using Clickers to Generate Discussion on Writing Proofs.* **Shannon R. Lockard**, Bridgewater State University (1067-G1-2131)

4:15PM (468) *The Lurch Project: A word processor that checks your math.* **Nathan C Carter***, Bentley University, and **Kenneth G Monks**, University of Scranton (1067-G1-2168)

4:35PM ► (469) *Students of MATH 341,* Advances in Number Theory, **1** (2010), 1–30. **Sam Vandervelde**, St. Lawrence University (1067-G1-1757)

4:55PM ► (470) *Teaching Proofs in Abstract Algebra: How important are proof structure, group work, and student presentations?* **Mindy Beth Capaldi**, Valparaiso University (1067-G1-911)

5:15PM (471) *Within ϵ of independence: An attempt to produce independent proof-writers via an IBL approach in a real analysis course.* **Dana C. Ernst***, Plymouth State University, and **Angela Hodge**, North Dakota State University (1067-G1-2358)

5:35PM ► (472) *Engaging abstract algebra students in the craft of proof writing.* Preliminary report. **Jennifer A Bergner**, Salisbury University (1067-G1-1100)

5:55PM ► (473) *Introducing Proofs to Calculus Students.* **Minah Oh**, James Madison University (1067-G1-1107)

6:15PM ► (474) *Successful Strategies for Improving the Proof Writing of Linear Algebra Students.* **Lesley W Wiglesworth**, Centre College (1067-G1-2346)

MAA Session on Harnessing Mobile Communication Devices and Online Communication Tools for Mathematics Education, II

2:15 PM – 3:10 PM **Rhythms II and III, 2nd Floor, Sheraton**

Organizers: **Michael B. Scott**, California State University Monterey Bay

Jason A. Aubrey, University of Missouri-Columbia

2:15PM ► (475) *The Joy of Numbers and Wikis.* Preliminary report. **Erica L Johnson**, St. John Fisher College (1067-H1-2039)

2:35PM ► (476) *The experience of newbie helpers in a mathematics, open, online, homework help forum: Becoming part of a community of helpers.* **Carla C. van de Sande***, Arizona State University, and **E. Hsu**, San Francisco State University (1067-H1-2269)

2:55PM ► (477) *Treatment for the "Submit Answer" Addict: Active Interventions for Struggling Calculus Students identified by WeBWorK Performance Data.* **Aaron Wangberg**, Winona State University (1067-H1-2382)

MAA Session on the Scholarship of Teaching and Learning in Collegiate Mathematics, II

2:15 PM – 5:10 PM **Rhythms I, 2nd Floor, Sheraton**

Organizers: **Jacqueline M. Dewar**, Loyola Marymount University

Thomas F. Banchoff, Brown University

Pam Crawford, Jacksonville University

Edwin P. Herman, University of Wisconsin-Stevens Point

Nathan Wodarz, University of Wisconsin-Stevens Point

2:15PM (478)
Re-testing as a strategy to promote equity.
Dale J Winter, Carnegie Mellon University (1067-V1-1490)

2:35PM (479)
Designing Precalculus for a Diverse Audience.
Erich A McAlister, Fort Lewis College (1067-V1-1612)

2:55PM ▶ (480)
Effects of a Modified Moore Method on Performance, Attitudes and Efficacy in Precalculus.
Brad Bailey, North Georgia College & State University (1067-V1-1151)

3:15PM ▶ (481)
A comparison of two paths in college level calculus. Preliminary report.
Erin Terwilleger Mullen* and **Amit Savkar**, University of Connecticut (1067-V1-2119)

3:35PM (482)
Implementing a Web-based System for Tagging Errors in Freshman Calculus Using Pen-Technology.
Marilyn Reba*, **Allen Guest**, **Calvin Williams** and **Roy Pargas**, Clemson University (1067-V1-1413)

3:55PM ▶ (483)
A quantitative and qualitative comparison of homework structures in a multivariable calculus class. Preliminary report.
Judith Lynn Gieger*, **John C. Nardo**, **Karen L. Schmeichel** and **Leah R. Zinner**, Oglethorpe University (1067-V1-1900)

4:15PM (484)
Student learning and retention of key concepts in sequences and series.
Rebecca J. Schmitz* and **Harvey Keynes**, University of Minnesota (1067-V1-2088)

4:35PM ▶ (485)
What Does it Mean for a Student to Understand the First-Year Calculus?: Perspectives of 24 Experts.
Kimberly Santucci Sofronas*, Emmanuel College, **Thomas C DeFranco**, **Charles Vinsonhaler**, University of Connecticut, **Nick Gorgievski**, Nichols College, **Larissa Schroeder**, University of Hartford, and **Chris Hamelin**, University of Connecticut (1067-V1-203)

4:55PM ▶ (486)
Group Work and Self-Efficacy in a Business Calculus Class.
Gregory A Kelsey, University of Illinois at Urbana-Champaign (1067-V1-30)

MAA Session on Innovations in Service-Learning at All Levels

2:15 PM – 6:10 PM
St. Jerome, 3rd Floor, JW Marriott

Organizers: **Karl-Dieter S. Crisman**, Gordon College
Rachelle Ankney, North Park University
Robert V. Perlis, Louisiana State University

2:15PM ▶ (487)
Opportunities and Challenges in Incorporating Service-Learning in Mathematical Sciences Programs.
Charles R. Hadlock, Bentley University (1067-K1-1465)

2:35PM (488)
Community Service-Learning in Mathematics: Models for Course Design.
Debra L. Hydorn, University of Mary Washington (1067-K1-1296)

2:55PM ▶ (489)
Serve While You Learn: A Quantitative Literacy Course. Preliminary report.
Karen Batt Stanish, Keene State College (1067-K1-2137)

3:15PM (490)
Serving Hope- How to build service-learning into your non-major mathematics courses to benefit the local community.
Melinda S Schulteis, Concordia University, Irvine (1067-K1-855)

3:35PM ▶ (491)
Just Math: Learning about Justice with Math vs. Doing Justice with Math. Preliminary report.
Rachelle M. Ankney, North Park University (1067-K1-1507)

3:55PM (492)
Real Data & Service Learning Projects in Statistics.
Brad Bailey* and **Robb Sinn**, North Georgia College & State University (1067-K1-1524)

4:15PM ▶ (493)
Mathematical and Moral Development Through Service-Learning. Preliminary report.
Karl-Dieter Crisman, Gordon College (1067-K1-2037)

4:35PM ▶ (494)
Service-Learning in an Interdisciplinary Mathematics and Economics Course.
Shafii-Mousavi Morteza*, Indiana University South Bend, and **Kochanowski Paul**, Indiana Univesity South Bend (1067-K1-76)

4:55PM ▶ (495)
Disaster Modeling – Beyond the Numbers.
Benjamin Galluzzo, Shippensburg University (1067-K1-2164)

5:15PM (496)
A Model for the Community.
Tim Chartier, Davidson College (1067-K1-913)

5:35PM ▶ (497)
A Service Project in a Capstone Modeling Course.
Ethan Berkove, Lafayette College (1067-K1-1402)

5:55PM *Northern Territory Maths Camp.*
▶ (498) **B. Carrigan***, **C. Carrigan**, **B. Kozak** and **C. Rodger**, Auburn University (1067-K1-1320)

MAA Session on Wavelets In Undergraduate Education, II

2:15 PM – 3:30 PM   Mardi Gras BC,
3rd Floor, Marriott

Organizers: **Caroline Haddad**, SUNY Geneseo

Catherine A. Beneteau, University of South Florida

David K. Ruch, Metropolitan State College of Denver

Patrick J. Van Fleet, University of St. Thomas

2:15PM *Who Are You? An Image Identification*
▶ (499) *Project Using Wavelet Packet Analysis.* **Kevin F. Palmowski**, State University of New York at Geneseo (1067-Y5-1539)

2:35PM *Multiwavelets and Image Compression.*
▶ (500) **Cristen Bonz***, **Elizabeth Motz** and **Susan Ray**, University of St Thomas (1067-Y5-1901)

2:55PM *An Undergraduate Research Project on*
▶ (501) *Multiwavelets.* Preliminary report. **Bruce W. Atkinson**, Samford University (1067-Y5-1269)

3:15PM *Teaching operator theory to*
▶ (502) *undergraduates via frames.* Preliminary report. **Veronika Furst**, Fort Lewis College (1067-Y5-1753)

MAA General Contributed Paper Session, IV

2:15 PM – 5:55 PM   St. Claude, 3rd
Floor, JW Marriott

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

2:15PM *Comparing Circular and Spherical*
▶ (503) *Inversions.* Preliminary report. **Deirdre L Smeltzer*** and **Owen D Byer**, Eastern Mennonite University (1067-Z1-1470)

2:30PM *Applications of Spherical Inversions.*
▶ (504) Preliminary report. **Owen D Byer*** and **Deirdre L Smeltzer**, Eastern Mennonite University (1067-Z1-1476)

2:45PM *The* (ColoredCubes)[3] *Problem.*
▶ (505) **Ethan Berkove**, Lafayette College (1067-Z1-1405)

3:00PM *Folding Math Together - A Senior Seminar*
▶ (506) *in Origami.* **Cathy W. Carter***, **Brittany Nicole Course** and **Alan Killen**, Christian Brothers University (1067-Z1-2115)

3:15PM *Tiling a square with squares.* Preliminary
▶ (507) report. **Iwan Praton**, Franklin and Marshall College (1067-Z1-565)

3:30PM *Platonic Solid Puzzles and Patterns.*
  (508) **Mike Long**, Shippensburg University (1067-Z1-1957)

3:45PM *Packing the hypercube.*
▶ (509) **David Offner**, Westminster College (1067-Z1-1737)

4:00PM *Asymptotic Connectivity of Hyperbolic*
▶ (510) *Tilings.* Preliminary report. **Robin Neumayer**, University of South Carolina (1067-Z1-2255)

4:15PM *Affine Transformations and Conformal*
▶ (511) *Invariants.* Preliminary report. **James R. Valles Jr*** and **Alexander Yu. Solynin**, Texas Tech University (1067-Z1-2378)

4:30PM *Non-existence of regular polygons in the*
▶ (512) *Cartesian plane with vertices at integer coordinates, except for squares.* **Jon Davidson**, Southern State Community College (1067-Z1-1992)

4:45PM *Discussing Symmetries of Polyhedra on*
▶ (513) *their Structures.* **Joy Marie D'Andrea**, University of South Florida (1067-Z1-1415)

5:00PM *A Geodesic- and Parallel-Transport*
▶ (514) *Based, Mass-Spring-Damper Error System on the Euclidean Sphere.* **Jason M Osborne**, Frank W. Olin College of Engineering (1067-Z1-519)

5:15PM *Contact angle for minimal surfaces in the*
  (515) *sphere S^5.* **Rodrigo Ristow Montes**, Federal University of Parana - UFPR (1067-Z1-23)

5:30PM *Minimizing networks in Snell Geometry;*
▶ (516) *the Snell-Steiner criterion.* **J Mealy*** and **Gregory Koch**, Austin College (1067-Z1-1685)

5:45PM *Building a Noncommutative Ring from a*
▶ (517) *Finite Directed Graph.* Preliminary report. **Michael J Bardzell**, Salisbury University (1067-Z1-1019)

SIAM Minisymposium on Applications of Difference and Differential Equations in Ecology and Epidemiology, II

2:15 PM – 6:10 PM   Bayside A, 4th Floor, Sheraton

Organizers: **Zhilan Feng**, Purdue University

Yun Kang, Arizona State University

2:15PM *A Stage-Structured Dispersal Model with*
  (518) *Constant and Periodic Environments.* **Azmy S. Ackleh***, **Ross A. Chiquet** and **Pei Zhang**, University of Louisiana at Lafayette (1067-92-545)

2:45PM *The Net Reproductive Number R_0 for*
(519) *Periodic Matrix Models of Structured Population Growth.*
J. M. Cushing*, University of Arizona, and **A. S. Ackleh**, University of Louisiana at Lafayette (1067-92-654)

3:15PM *Bifurcation and stability of a Ricker-type*
▶ (520) *competition model.* Preliminary report.
Saber N Elaydi, Trinity University (1067-39-670)

3:45PM *A Darwinian dynamics model for the*
(521) *evolution of "comfort behavior" in seabirds.* Preliminary report.
Shandelle M. Henson, Andrews University (1067-92-758)

4:15PM *Recent Results on Control Problems for*
(522) *Chemostats.*
Frederic Mazenc, Projet INRIA DISCO, CNRS-Supelec, and **Michael Malisoff***, Louisiana State University (1067-92-461)

4:45PM *Two Peas in a Pod: Discrete and*
(523) *Continuous Lotka-Volterra Competition Systems.* Preliminary report.
Lih-Ing Wu Roeger, Texas Tech University (1067-39-632)

5:15PM *On a Mutation Selection Model.*
(524) Preliminary report.
Azmy S. Ackleh, University of Louisiana at Lafayette, and **Robert J. Sacker***, University of Southern California (1067-92-605)

5:45PM *Persistence of interacting populations in*
(525) *fluctuating environments.*
Sebastian Schreiber, University of California, Davis (1067-92-709)

MAA Committee on Graduate Students/Young Mathematicians Network Panel Discussion

2:15 PM – 3:35 PM **La Galerie 6, 2nd Floor, Marriott**

How to interview for a job in the mathematical sciences.

Organizer: **David Manderschied**, University of Nebraska-Lincoln

Panelists: **Michael Axtell**, College of St. Thomas

Allen Butler, Daniel H. Wagner Associates, Inc.

James Freeman, Cornell College

David Manderschied

Sarah Ann Stewart, Belmont University

MAA Panel Discussion

2:15 PM – 3:35 PM **La Galerie 2, 2nd Floor, Marriott**

Reporting progress: A minisymposium of projects from the NSF Course, Curriculum, and Laboratory Improvement Program.
Organizers: **Dennis Davenport**, NSF DUE
Stephanie Fitchett, NSF DUE
Lee Zia, NSF DUE

AWM Business Meeting

2:15 PM – 2:45 PM **La Galerie 1, 2nd Floor, Marriott**

AMS Session on Differential Topology and Knot Theory

2:30 PM – 5:55 PM **Rosalie, 3rd Floor, JW Marriott**

2:30PM *Diffeomorphism Invariants from*
(526) *Topological Quantum Field Theories.*
Paul H Drube, University of Iowa (1067-55-1921)

2:45PM *A troublesome embedding of the unknot.*
(527) **Alexander Zupan**, The University of Iowa (1067-57-2205)

3:00PM *Concordance Genus of Knots.*
(528) **M Kate Kearney**, Indiana University (1067-57-2234)

3:15PM *Investigating hyperbolic link*
(529) *complements.* Preliminary report.
Morwen Thistlethwaite and **Anastasiia Tsvietkova***, University of Tennessee, Knoxville (1067-57-335)

3:30PM *Primitive/primitive and primitive/Seifert*
(530) *representatives of knots.* Preliminary report.
Brandy J Guntel, The University of Texas at Austin (1067-57-552)

3:45PM *Fractional powers of Dehn twists.*
(531) **Kashyap Rajeevsarathy**, University of Oklahoma (1067-57-933)

4:00PM *Classification of One-sided*
(532) *Incompressible Surfaces in Two Infinite Families of Seifert Fibered Spaces.*
Zhenyi Liu, Schaumburg, IL (1067-57-1176)

4:15PM *Tunnel One, Fibered Links.*
(533) **Matt Rathbun**, Michigan State University (1067-57-1275)

4:30PM *On the $\mathcal{R}$-filtration for the Heegaard*
(534) *Floer chain complex of a branched double-cover.*
Eamonn Tweedy, University of California Los Angeles (1067-57-1994)

4:45PM *Khovanov-Rozansky Homology and*
(535) *Conway Mutation.*
Thomas Jaeger, Michigan State University (1067-00-2084)

5:00PM (536) *Connections between Floer-type invariants and Morse-type invariants of Legendrian knots.*
Michael B. Henry, The University of Texas at Austin (1067-57-1497)

5:15PM (537) *HOMFLY-PT polynomial and Legendrian links in the solid torus.*
Dan Rutherford, Duke University (1067-57-2073)

5:30PM (538) *Identifying the Canonical Component for the Whitehead Link.*
Emily R Landes, University of Texas, Austin (1067-54-967)

5:45PM (539) *A Geometric Reverse to Quillen's Plus Construction.*
Jeffrey J Rolland, University of Wisconsin - Milwaukee (1067-57-1097)

MAA Section Officers

2:30 PM – 5:00 PM **Mardi Gras D, 3rd Floor, Marriott**

Chair: **Rick Gillman**, Valparaiso University

AWM Schafer Minisymposium

2:45 PM – 6:15 PM **La Galerie 1, 2nd Floor, Marriott**

Organizers: **Sami Assaf**, Massachusetts Institute of Technology
Patricia Hersh, North Carolina State University

2:45PM ▶ (540) *Life in the Trenches with Alice–The Early Years.*
Mary W. Gray, American University, Washington DC (1067-01-567)

3:15PM ▶ (541) *Sparse Regular Random Graphs: Spectra and Eigenvectors.*
Ioana Dumitriu* and **Soumik Pal**, University of Washington (1067-60-2169)

3:45PM (542) *Bose-Einstein condensation, the NLS, and a phase transition.*
Kay L Kirkpatrick, Courant Institute/Paris IX Dauphine (1067-82-496)

4:15PM (543) *Do the primes behave independently?*
Melanie Matchett Wood, American Institute of Mathematics and Stanford University (1067-11-529)

4:45PM (544) *Traces and topological fixed point theory.*
Kate Ponto, University of Kentucky (1067-55-1226)

5:15PM *Panel Discussion: Getting Started as a Research Mathematician.*

AMS Special Session on Transseries and Ordered Exponential Fields, II

3:15 PM – 5:05 PM **Napoleon B2, 3rd Floor, Sheraton**

Organizers: **Gerald A. Edgar**, The Ohio State University

Ovidiu Costin, The Ohio State University
Lou P. van den Dries, University of Illinois, Urbana-Champaign

3:15PM (545) *On linearly ordered structures of finite rank.*
Charles Steinhorn, Vassar College (1067-03-1168)

3:45PM (546) *Super-exact quasi-analytic classes and o-minimality.*
Tobias Kaiser, Universität Passau, Germany, **Jean-Philippe Rolin**, Université de Bourgogne, France, and **Patrick Speissegger***, McMaster University (1067-26-821)

4:15PM (547) *Transseries: Composition, Recursion, and Convergence.*
Gerald A Edgar, The Ohio State University (1067-06-661)

4:45PM (548) *Surreal Ordered Exponential Fields.*
Philip Ehrlich, Ohio University (1067-06-528)

MAA Invited Address

3:20 PM – 4:10 PM **Great Ballroom A-C, 5th Floor, Sheraton**

(549) *On the intersection of graphs and geometry.*
Edward R. Scheinerman, Johns Hopkins University (1067-A0-39)

MAA Invited Paper Session on Laplacian Growth: Visual Mathematics

3:30 PM – 6:20 PM **Rhythms II and III, 2nd Floor, Sheraton**

Organizers: **Yuval Peres**, Microsoft Research
Lionel Levine, Massachusetts Institute of Technology
Alexander Holroyd, Microsoft Research

3:30PM ▶ (550) *Digital Snowflakes.*
Janko Gravner, University of California at Davis (1067-AB-1370)

4:00PM ▶ (551) *Random Sorting.*
Alexander E Holroyd, Microsoft Research (1067-AB-1446)

4:30PM ▶ (552) *Sandpiles, domino tilings, and Chebyshev polynomials.* Preliminary report.
David Perkinson, Reed College (1067-AB-1770)

5:00PM (553) *Fast Simulation of Large-Scale Growth Models.*
Tobias Friedrich, Max-Planck-Institut für Informatik (1067-AB-2012)

5:30PM ▶ (554) *Self-organizing structures in rotor-router blobs.*
James G. Propp, University of Massachusetts Lowell (1067-AB-2120)

6:00PM *On the Roundness of Rotor Router Blobs.*
▶ (555) **Matthew Cook**, University of Zurich and ETH Zurich (1067-AB-2198)

MAA-NCTM Mutual Concerns Committee Panel Discussion

3:50 PM – 5:10 PM   La Galerie 6, 2nd Floor, Marriott

Transition from high school to college: Should there be an alternate to calculus?

Organizer: **Gail Burrill**, Michigan State University

Panelists: **Danny Kaplan**, Macalester College

Gregory D. Foley, Ohio University

Thomas R. Butts, University of Texas at Dallas

Al Cuoco, Education Development Center

Michael Shaughnessy, Portland State University

Gail Burrill

MAA Project NExT-Young Mathematicians' Network Poster Session

4:00 PM – 6:00 PM   Napoleon A1-A3, 3rd Floor, Sheraton

Organizers: **Michael Axtell**, University of St. Thomas

Kim Roth, Juniata College

Reception for Undergraduate Students

4:00 PM – 5:00 PM   Gallery Ballroom, 1st Floor, Sheraton

MAA Panel Discussion

5:00 PM – 7:00 PM   Mardi Gras BC, 3rd Floor, Marriott

Current issues in actuarial science education.

Organizers: **Robert Buck**, Slippery Rock University

Bettye Anne Case, Florida State University

Kevin Charlwood, Washburn University

Steve Paris, Florida State University

Panelists: **Steve Paris**

Bettye Anne Case

Robert Buck

AWM Schafer Minisymposium Panel Discussion

5:15 PM – 6:15 PM   La Galerie 1, 2nd Floor, Marriott

Getting started as a research mathematician.

Moderator: **Elizabeth Wilmer**, Oberlin College

Panelists: **Linda Green**, Dominican University of California

Zvezdelina Stankova, Mills College

Caroline Klivans, University of Chicago

Josephine Yu, Georgia Institute of Technology

SIGMAA on Mathematicians in Business, Industry, and Government Business Meeting

5:30 PM – 6:30 PM   Rhythms I, 2nd Floor, Sheraton

SIGMAA on the History of Mathematics Reception and Business Meeting

5:30 PM – 6:30 PM   La Galerie 2, 2nd Floor, Marriott

SIGMAA on Quantitative Literacy Business Meeting

5:30 PM – 6:00 PM   La Galerie 6, 2nd Floor, Marriott

Reception for Graduate Students and First-Time Participants

5:30 PM – 6:30 PM   Armstrong Ballroom, 8th Floor, Sheraton

SIGMAA on Quantitative Literacy Reception and Panel Discussion

6:00 PM – 7:00 PM   La Galerie 6, 2nd Floor, Marriott

Mathematics and democracy ten years later.

SIGMAA on the History of Mathematics Guest Lecture

6:30 PM – 7:15 PM   La Galerie 2, 2nd Floor, Marriott

6:30PM *Bridges of Trigonometry in the*
▶ (556) *Anglo-American Colonies and the United States.* Preliminary report.
Joe Albree, Auburn University Montomery (1067-A0-355)

AMS Josiah Willard Gibbs Lecture

8:30 PM – 9:30 PM   **Great Ballroom
A-C, 5th Floor, Sheraton**

(557) *Mathematical problems in systemic risk.*
George C. Papanicolaou, Stanford
University (1067-60-2)

AWM Reception

9:30 PM – 11:00 PM   **Great Ballroom
Foyer, 5th Floor, Sheraton**

Friday, January 7

Joint Meetings Registration

7:30 AM – 4:00 PM   **Across from La
Galerie 4, 2nd Floor, Marriott**

MAA Session on Innovative and Effective Ways to Teach Linear Algebra

7:20 AM – 11:55 AM   **Rhythms I,
2nd Floor, Sheraton**

Organizers: **David M. Strong**,
Pepperdine University
Gilbert Strang,
Massachusetts Institute of
Technology
David C. Lay, University of
Maryland

7:20AM   *Rotations via Quaternions and*
► (558)   *Interpolation.*
Paul Raymond Bouthellier, University of
Pittsburgh-Titusville (1067-L1-328)

7:40AM   *Ray-based Tomography: An application*
► (559)   *for linear algebra.*
Murphy Waggoner, Simpson College
(1067-L1-1459)

8:00AM   *Visualizing Discrete Dynamical Systems.*
► (560)   **Thomas W Polaski**, Winthrop University
(1067-L1-1523)

8:20AM   *A geometric view of orthogonal*
► (561)   *diagonalization of symmetric matrices.*
Robert L. Sachs, George Mason
University (1067-L1-1615)

8:40AM   *A nickel and dime example for motivating*
► (562)   *a variety of linear algebra concepts.*
David Strong, Pepperdine University
(1067-L1-413)

9:00AM   *I am the Alpha, I am the Omega.*
► (563)   **Aldo R Maldonado**, Park University
(1067-L1-868)

9:20AM   *What Educational Portal of International*
(564)   *Linear Algebra Society(ILAS) can do?*
Kim Kyung-Won* and **Lee Sang-Gu**,
Sungkyunkwan University (1067-L1-971)

9:40AM   *Mobile Sage-Math for Linear Algebra and*
(565)   *its Application.*
Lee Sage-Gu* and **Kim Kyung-Won**,
Sungkyunkwan University (1067-L1-972)

10:00AM   *An Evaluation of Students' Experiences in*
► (566)   *a Technology-based Linear Algebra
Course.* Preliminary report.
Karsten K. Schmidt, Schmalkalden
University of Applied Sciences, Germany
(1067-L1-459)

10:20AM   *Eigenvalues first? Teaching linear*
► (567)   *algebra with computation, then
application, then theory.* Preliminary
report.
Jason Grout, Drake University
(1067-L1-1877)

10:40AM   *Interviews to Assess Vocabulary and*
► (568)   *Understanding.* Preliminary report.
Steven M Hetzler, Salisbury University
(1067-L1-2094)

11:00AM   *Detailing an Innovative, Student-Centered*
► (569)   *Instructional Sequence that Builds from
Students' Intuitive Understandings of
Vector to Formal Definitions of Span and
Linear Dependence.*
Megan J Wawro*, San Diego State
University & University of California, San
Diego, and **Michelle Zandieh**, Arizona
State University (1067-L1-1430)

11:20AM   *Inverting the Linear Algebra Classroom.*
► (570)   **Robert Talbert**, Franklin College
(1067-L1-2079)

11:40AM   *The Second Undergraduate Level Course*
► (571)   *in Linear Algebra.* Preliminary report.
Steven J Leon, University of
Massachusetts Dartmouth
(1067-L1-1379)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, III

8:00 AM – 11:50 AM   **Orleans, 3rd
Floor, JW Marriott**

Organizers: **Darren A. Narayan**,
Rochester Institute of
Technology
Bernard Brooks, Rochester
Institute of Technology
Jobby Jacob, Rochester
Institute of Technology
Jacqueline A. Jensen, Sam
Houston State University
Carl V. Lutzer, Rochester
Institute of Technology

8:00AM   *A Generalization of Continued Fractions.*
► (572)   **Maxwell Anselm*** and **Steven H
Weintraub**, Lehigh University
(1067-11-33)

8:30AM (573) *The Splitting Fields of Generalized Rikuna Polynomials.*
Zev Chonoles*, Brown University, **John Cullinan**, Bard College, **Hannah Hausman**, **Allison Pacelli**, **Sean Pegado**, Williams College, and **Fan Wei***, Massachusetts Institute of Technology (1067-12-1117)

9:00AM ▶ (574) *Minimum Number of Holes in Unavoidable Sets of Partial Words.* Preliminary report.
F. Blanchet-Sadri, University of North Carolina at Greensboro, **Laure Flapan***, Yale University, and **Stephen Watkins**, Vanderbilt University (1067-05-904)

9:30AM (575) *Minimum hole sparsity for partial word avoidability.*
F. Blanchet-Sadri, University of North Carolina at Greensboro, **Kevin Black**, Harvey Mudd College, and **Andrew Zemke***, Rochester Institute of Technology (1067-05-1178)

10:00AM ▶ (576) *Generating Artificial Social Networks.*
Kate Burgers*, Harvey Mudd College, and **Julianne Upton**, Linfield College (1067-91-310)

10:30AM ▶ (577) *Bifurcation structure of external cavity mode and compound laser mode solutions.*
Christina Battista*, Rochester Institute of Technology, and **Jeannette Benham**, Bard College (1067-37-313)

11:00AM ▶ (578) *The Computation of $R(K_5 - P_3, K_5) = 25$*.*
Jesse Calvert*, Washington University in St. Louis, and **Michael Schuster**, North Carolina State University (1067-05-312)

11:30AM (579) *Rank numbers for generalized ladders, some trees and unicyclic graphs.*
Peter Richter*, University of Rochester, **Emily Sergel**, Rutgers University, and **Anh Tran**, Rochester Institute of Technology (1067-05-311)

AMS-MAA-MER *Special Session on Mathematics and Education Reform, I*

8:00 AM – 11:50 AM **Napoleon C1, 3rd Floor, Sheraton**

Organizers: **William H. Barker**, Bowdoin College
William G. McCallum, University of Arizona
Bonnie S. Saunders, University of Illinois at Chicago

8:00AM ▶ (580) *The Mathematical Education of Teachers.* Preliminary report.
W. James Lewis, University of Nebraska-Lincoln (1067-97-1749)

8:30AM ▶ (581) *Teaching Mathematics to Future Teachers: The Value of Co-Teaching Courses with Mathematics Educators.*
Catherine Beneteau*, University of South Florida, and **Saad El-Zanati**, Illinois State University (1067-97-1605)

9:00AM ▶ (582) *Teaching Mathematics to Future Teachers: Connecting Mathematics to Aspects of Teaching in University Courses.*
Rebecca H McGraw* and **Chantel Blackburn**, University of Arizona (1067-97-1592)

9:30AM (583) *Breadth, Depth, Disputes, Drama, and Campus Pranks: The Possibilities and Pleasures of Co-teaching Logic.*
James M Henle, Smith College (1067-03-88)

10:00AM ▶ (584) *A course emphasizing mathematical logic and reasoning that is appropriate for general education and elementary education majors.*
Warren W. Esty, Montana State University, Bozeman, MT 59717 (1067-97-916)

10:30AM ▶ (585) *Seemingly Abstruse Logical Principles Have Practical Importance.*
Susanna S Epp, DePaul University (1067-97-2162)

11:00AM ▶ (586) *Applied Logic Courses in the Mathematics Curriculum.*
Lawrence S. Moss, Indiana University, Bloomington (1067-97-725)

11:30AM ▶ (587) *Technology in Logic Education: Courseware, Automated Assessment and Data Mining.*
Dave Barker-Plummer, CSLI/Stanford University (1067-97-1571)

AMS-MAA *Special Session on History of Mathematics, III*

8:00 AM – 11:50 AM **Maurepas, 3rd Floor, JW Marriott**

Organizers: **Sloan E. Despeaux**, Western Carolina University
Craig G. Fraser, University of Toronto
Deborah Kent, Hillsdale College

8:00AM *This part of this session is also cosponsored by The International Commission for the History of Mathematics (ICHM).*

8:00AM ▶ (588) *The Quadrature of the Circle: 17th century impossibility arguments.*
Jesper Lutzen, University of Copenhagen (1067-01-1079)

8:30AM ▶ (589) *The quarrel on the invention of the calculus in Jean E . Montucla and Joseph J. L. de Lalande, Histoire des Mathématiques (1758/1799-1802).*
Niccolò Guicciardini, Università di Bergamo, Italy (1067-01-1017)

9:00AM ▶ (590) *"Splendidly isolated"? Some reflections on the transnationality of 19th-century British mathematics.* Preliminary report. **Adrian Rice**, Randolph-Macon College (1067-01-521)

9:30AM ▶ (591) *Salvatore Pincherle and the 1918 Grand Prix des sciences mathématiques: The Third Man.* Preliminary report. **Daniel S. Alexander**, Drake University (1067-01-2027)

10:00AM (592) *Shades of modernism in understandings of applied mathematics: von Neumann's economic system of equations and Rashevsky's model of cellular multiplication.* **Tinne Hoff Kjeldsen**, IMFUFA, NSM, Roskilde University (1067-01-1160)

10:30AM ▶ (593) *The lure of the fundamental probability set of equally likely events.* Preliminary report. **Byron E. Wall**, York University (1067-01-1110)

11:00AM ▶ (594) *Mobilizing Mathematics: The American Mathematical Society and World War II.* Preliminary report. **Karen V. H. Parshall**, University of Virginia (1067-01-1225)

11:30AM ▶ (595) *George Birkhoff–"the Poincaré of America".* **June E. Barrow-Green**, The Open University (1067-01-1018)

AMS-SIAM Special Session on Mathematics of Computation: Algebra and Number Theory, I

8:00 AM – 11:50 AM **Napoleon D2, 3rd Floor, Sheraton**

Organizers: **Gregor Kemper**, Technische Universität München
Michael J. Mossinghoff, Davidson College
Igor E. Shparlinski, Macquarie University

8:00AM (596) *The sum-product algorithm for binary codes having check nodes of degree two.* **Michael E. O'Sullivan***, San Diego State University, and **John Brevik**, Long Beach State Univ. (1067-94-1716)

8:30AM (597) *Complexity of the Graph Isomorphism Problem.* Preliminary report. **Derksen Harm**, University of Michigan (1067-05-2154)

9:00AM (598) *Combining Group Theory and Number Theory Computations.* **Nigel Boston**, University of Wisconsin - Madison (1067-11-374)

9:30AM ▶ (599) *Class Group and Regulator Computation in Quadratic Fields.* **Michael J Jacobson, Jr.**, University of Calgary (1067-11-1191)

10:00AM ▶ (600) *Genus 1 point counting in quadratic space and essentially quartic time.* **Andrew V Sutherland**, Massachusetts Institute of Technology (1067-11-436)

10:30AM (601) *Finding the rational points on a certain genus 12 curve.* **Ralph Greenberg**, University of Washington, **Karl Rubin** and **Alice Silverberg***, University of California, Irvine (1067-11-708)

11:00AM (602) *Efficient Divisor Reduction on Hyperelliptic Curves.* **Renate Scheidler***, Unversity of Calgary, Canada, **Roberto Avanzi**, Ruhr-Universitaet Bochum, Germany, **Michael J Jacobson, Jr.**, University of Calgary, Canada, and **Andreas Stein**, Universitaet Oldenburg, Germany (1067-11-330)

11:30AM ▶ (603) *Finding small sets whose subset sums include a given set.* Preliminary report. **David Petrie Moulton**, IDA–Center for Communications Research (1067-11-1014)

AMS-ASL Special Session on Logic and Analysis, I

8:00 AM – 11:50 AM **Napoleon C2, 3rd Floor, Sheraton**

Organizers: **Jeremy Avigad**, Carnegie Mellon University
Ulrich W. Kohlenbach, Technische Universität Darmstadt
Henry Towsner, University of California Los Angeles

8:00AM (604) *Inverting the Furstenberg correspondence.* **Jeremy Avigad**, Department of Philosophy, Carnegie Mellon University (1067-37-1533)

8:30AM (605) *Beyond the Correspondence Principle.* **Henry P Towsner**, University of California at Los Angeles (1067-03-750)

9:00AM (606) *Algorithmic randomness and ergodic theorems.* **Mathieu Hoyrup**, LORIA, INRIA Nancy - France (1067-68-808)

9:30AM (607) *Invariant measures on countable models.* **Nathanael L. Ackerman**, University of California, Berkeley, **Cameron E. Freer***, University of Hawaii at Manoa, and **Rehana R. Patel**, Harvard University (1067-03-794)

10:00AM (608) *A constructive law of large numbers with applications.* **Peter Gacs**, Boston University (1067-60-2076)

10:30AM (609) *Computability and Complexity of Computable Cauchy Problems.* **Ning Zhong**, University of Cincinnati (1067-03-741)

11:00AM (610) *Recursive analysis of singular ordinary differential equations.*
Peter Buser*, Ecole Polytechnique Fédérale de Lausanne, and **Bruno Scarpellini**, University of Basel (1067-03-2034)

11:30AM (611) *Exploratory Experimentation and Computation.*
David H Bailey, Lawrence Berkley National Labs, and **Jonathan M Borwein***, University of Newcastle, NSW Australia (1067-33-223)

AMS Special Session on Birational Geometry and Moduli Spaces (Mathematics Research Communities session), I

8:00 AM – 11:50 AM Napoleon B1, 3rd Floor, Sheraton

Organizers: **Kevin Tucker**, University of Utah
Dawei Chen, University of Illinois at Chicago
Amanda Knecht, University of Michigan
David Swinarski, University of Georgia

8:00AM (612) *The quantum equivariant cohomology of flag varieties.*
Linda Chen, Swarthmore College (1067-14-1103)

8:30AM (613) *Polynomial Families of Tautological Classes on $\mathcal{M}_{g,n}^{rt}$.*
Steffen S Marcus*, Brown University, and **Renzo Cavalieri**, Colorado State University (1067-14-1206)

9:00AM (614) *Picard groups of normal surfaces.* Preliminary report.
Scott R Nollet, Texas Christian University (1067-14-572)

9:30AM (615) *Local Structure of the Compactified Jacobian.*
Jesse Kass*, University of Michigan, **Sebastian Casalaina-Martin**, University of Colorado at Boulder, and **Filippo Viviani**, University of Roma Tre (1067-14-1276)

10:00AM (616) *Ulrich bundles on del Pezzo surfaces.*
Yusuf Mustopa, University of Michigan (1067-14-789)

10:30AM (617) *Interpolation on surfaces in $\mathbb{P}^3$.*
Jack Huizenga, Harvard University (1067-14-671)

11:00AM (618) *The cone conjecture for Calabi–Yau pairs.*
Artie Prendergast-Smith, Leibniz Universität Hannover (1067-14-1227)

11:30AM (619) *DB pairs and vanishing theorems.*
Sándor J Kovács, University of Washington (1067-14-1075)

AMS Special Session on Wavelets, Tilings, and Iterated Function Systems, I

8:00 AM – 11:50 AM Napoleon C3, 3rd Floor, Sheraton

Organizers: **Palle E. Jorgensen**, University of Iowa
David R. Larson, Texas A&M University
Gestur Olafsson, Louisiana State University

8:00AM (620) *Tensor products of generalized multiresolution analyses.* Preliminary report.
Judith A. Packer, University of Colorado at Boulder (1067-42-1165)

8:30AM (621) *Balayage and the theory of generalized Fourier frames.* Preliminary report.
Enrico Au-Yeung and **John J. Benedetto***, Norbert Wiener Center, UMD, College Park (1067-42-263)

9:00AM (622) *Sampling in reproducing kernel Banach spaces on Lie groups.*
Jens Gerlach Christensen, University of Maryland, College Park (1067-43-556)

9:30AM (623) *Homogeneous Besov spaces on the stratified Lie groups as generalized coorbit spaces.* Preliminary report.
Azita Mayeli, City College of Technology, City University of New York (1067-46-1794)

10:00AM (624) *Wavelets and Framelets in Sobolev Spaces.* Preliminary report.
Bin Han, University of Alberta (1067-42-1309)

10:30AM (625) *Isometries on Bernoulli measures.* Preliminary report.
Palle Jorgensen, University of Iowa, **Keri Kornelson***, University of Oklahoma, and **Karen L. Shuman**, Grinnell College (1067-42-637)

11:00AM (626) *Finite sums of projections.*
Victor Kaftal*, University of Cincinnati, **Ping W Ng**, University of Louisiana, and **Shuang Zhang**, University of Cincinnati (1067-47-1624)

11:30AM (627) *Bessel Sequences of Exponentials on Fractal Measures.*
Eric Weber, Iowa State University (1067-42-1050)

AMS Special Session on Stochastic Analysis and Random Phenomena, I

8:00 AM – 11:50 AM Maurepas Room, 3rd Floor, Sheraton

Organizers: **Ambar N. Sengupta**, Louisiana State University
P. Sundar, Louisiana State University

8:00AM (628) *Brownian Motions on Metric Graphs.* **Vadim Kostrykin**, University of Mainz, **Jurgen K. Potthoff***, University of Mannheim, and **Robert Schrader**, Institute of Theoretical Physics, Free University Berlin (1067-60-1441)

8:30AM (629) *SBM as the unique strong solution to an SPDE.* **Jie Xiong**, University of Tennessee (1067-60-1301)

9:00AM ► (630) *Gaussian Calculus and Wick Products (Joint work with Paolo Da Pelo and Alberto Lanconelli from the University of Bari, Italy).* Preliminary report. **Aurel Iulian Stan**, The Ohio State University at Marion (1067-60-1460)

9:30AM (631) *Self-similarity and long range dependence: some recent developments for the multivariate setting.* **Gustavo Didier***, Tulane University, and **Vladas Pipiras**, UNC-Chapel Hill (1067-60-1620)

10:00AM (632) *A Support Theorem for a Gaussian Radon Transform in Infinite Dimensions.* **Jeremy J Becnel***, Stephen F. Austin State University, and **Ambar N Sengupta**, Louisiana State University (1067-46-478)

10:30AM (633) *Equivalence Relationship between Forward Backward SDEs and Backward SPDEs.* **Jin Ma**, **Hong Yin*** and **Jianfeng Zhang**, University of Southern California (1067-60-766)

11:00AM (634) *A Stochastic Lagrangian Particle Model and Nonlinear Filtering for Three Dimensional Euler Flow with Jumps.* **Meng Xu***, University of Wyoming, and **Sritharan**, Naval Postgraduate School (1067-60-624)

11:30AM (635) *Bridges of random walks in a random environment.* **Jonathon Peterson***, Cornell University, and **Nina Gantert**, Institut fur Mathematishe Statistik (1067-60-136)

AMS Special Session on Model Theory of Fields and Applications (Mathematics Research Communities session), I

8:00 AM – 11:45 AM   Napoleon B2, 3rd Floor, Sheraton

Organizers: **Benjamin A. Hutz**, CUNY Graduate Center

Jana Marikova, Western Illinois University

Jerome Poineau, University of Strasbourg

Yimu Yin, University of Pittsburgh

8:00AM (636) *Unexpected imaginaries in valued fields with analytic structure.* Preliminary report. **Deirdre Haskell***, McMaster University, **Ehud Hrushovski**, Hebrew University, and **Dugald Macpherson**, University of Leeds (1067-03-2427)

9:00AM (637) *Topology of Berkovich Spaces.* **Jérôme Poineau**, University of Strasbourg (1067-14-987)

9:30AM (638) *On definability of types in dependent theories.* **Vincent N Guingona**, University of Maryland, College Park (1067-03-947)

10:00AM (639) *The Set of Restricted Complex Exponents for Expansions of the Reals.* Preliminary report. **Michael A. Tychonievich**, The Ohio State University (1067-03-1628)

10:30AM (640) *Globalizing locally compact local groups.* **Lou van den Dries**, University of Illinois at Urbana-Champaign, and **Isaac M Goldbring***, University of California, Los Angeles (1067-22-232)

11:00AM Discussion.

AMS Special Session on Commutative Algebra (Mathematics Research Communities session), I

8:00 AM – 11:50 AM   Napoleon B3, 3rd Floor, Sheraton

Organizers: **Christine Berkesch**, Stockholm University

Bhargav Bhatt, University of Michigan, Ann Arbor

Jason McCullough, University of California, Riverside

Javid Validashti, University of Kansas

8:00AM (641) *Applications of graded integral closures.* Preliminary report. **Craig Huneke**, University of Kansas (1067-13-1239)

8:30AM (642) *Coefficient theorems of Briançon-Skoda type.* Preliminary report. **Ian M. Aberbach** and **Aline Hosry***, University of Missouri (1067-13-491)

9:00AM (643) *Symbolic power of some classes of algebras.* Preliminary report. **Paolo Mantero**, Purdue Univeristy, and **Yu Xie***, University of Notre Dame (1067-13-385)

9:30AM (644) *Local cohomology modules as G-modules.* **Emily E Witt**, University of Michigan (1067-13-390)

10:00AM (645) *The Second Hilbert Coefficient of a Parameter Ideal in an Unmixed Ring.* **Lori A McDonnell**, University of Nebraska-Lincoln (1067-13-1071)

10:30AM *Conditions for the existence of totally*
(646) *reflexive modules.* Preliminary report.
Kristen A Beck, The University of Texas
at Arlington (1067-13-408)

11:00AM *Extending the Strong Lefschetz Property.*
(647) **Melissa Lindsey**, Purdue University
(1067-13-672)

11:30AM *Inverse systems, Gelfand-Tsetlin patterns*
(648) *and the weak Lefschetz property.*
Brian Harbourne, University of
Nebraska, **Hal Schenck** and **Alexandra
Seceleanu***, University of Illinois at
Urbana-Champaign (1067-14-1472)

AMS Special Session on Structured Models in Ecology, Evolution, and Epidemiology: Periodicity, Extinction, and Chaos, I

8:00 AM – 11:50 AM   Napoleon D3,
                                      3rd Floor, Sheraton

Organizers: **Sophia R.-J. Jang**, Texas
Tech University

Linda J. S. Allen, Texas Tech
University

Lih-Ing W. Roeger, Texas
Tech University

8:00AM *Nonlinear matrix models, evolution, and*
(649) *the dynamic dichotomy of semelparous
populations.*
Jim M. Cushing, University of Arizona
(1067-92-1724)

8:30AM *Modeling the Owned Cat Population in*
► (650) *Knox County, Tennessee.* Preliminary
report.
Suzanne Lenhart, University of
Tennessee (1067-92-1137)

9:00AM *Predicting Attenuant and Resonant*
(651) *2-Cycles in Periodically Forced
Discrete-Time 2-Species Population
Models.* Preliminary report.
John E. Franke*, North Carolina
State University, and **Matthew A.
Morena**, University of New Hampshire
(1067-92-1914)

9:30AM *Influenza and SEIR model with isolation.*
► (652) **Velasco-Hernandez**, Instituto Mexicano
del Petroleo, and **Maria Leite***, University
of Oklahoma (1067-34-1977)

10:00AM *Predator-prey model with strong Allee*
(653) *effect on prey population.*
Jinfeng Wang, Harbin Normal University,
Junping Shi*, College of William and
Mary, and **Junjie Wei**, Harbin Institute of
Technology (1067-34-1082)

10:30AM *A Spatiotemporal Model of Barley and*
(654) *Cereal Yellow Dwarf Virus Transmission
Dynamics with Seasonality, Age
Structure and Plant Competition.*
Vrushali A Bokil*, **Carrie Manore**, **Sean
M Moore**, Oregon State University,
Elizabeth T Borer, University of
Minnesota, and **Parviez R Hosseini**,
EcoHealth Alliance (1067-92-1832)

11:00AM *A mathematical model for the spatial*
(655) *transmission of dengue in a periodic
environment.*
Andrew L Nevai*, University of Central
Florida, and **Edy Soewono**, Institut
Teknologi Bandung (1067-92-2016)

11:30AM *Optimal Control of the Spread of Malaria*
► (656) *Super-Infectivity.* Preliminary report.
Folashade B. Agusto* and **Suzanne
Lenhart**, NIMBioS, University of
Tennessee, Knoxville (1067-92-516)

AMS Special Session on Boundary Control and Moving Interface in Coupled Systems of Partial Differential Equations, I

8:00 AM – 11:50 AM   Conde, 3rd Floor, JW Marriott

Organizers: **Lorena Bociu**, University of
Nebraska-Lincoln

Jean-Paul Zolesio,
CNRS-INLN and INRIA,
Sophia Antipolis, France

8:00AM *Concerning the uniform stabilization of*
(657) *fluid-structure interaction PDE models.*
George Avalos, University of
Nebraska-Lincoln (1067-35-756)

8:30AM *Global uniqueness and stability in inverse*
(658) *problems for second order hyperbolic
equations with a non-homogeneous
Neumann boundary term.*
Roberto Triggiani, University of Virginia
(1067-35-772)

9:00AM *Arterial blood flow modeling.*
(659) **Giovanna Guidoboni**, Department of
Mathematical Sciences, Indiana University
and Purdue University at Indianapolis
(IUPUI) (1067-35-667)

9:30AM *Variational Solution to Incompressible*
(660) *Euler Equation.*
Jean-Paul Zolesio, CNRS-INLN
(1067-35-1362)

10:00AM *A moving interface problem in blood flow.*
(661) **Suncica Canic**, University of Houston
(1067-35-1169)

10:30AM *Shape optimization for hyperbolic*
(662) *boundary problems with conservative
boundary conditions.*
Matthias Eller, Georgetown University
(1067-35-767)

11:00AM *Generation of dynamical flow and long*
(663) *time behavior of solutions to wave
equation with acoustic boundary
conditions.*
Irena Lasiecka* and **Philip Graber**,
University of Virginia (1067-35-596)

11:30AM *Existence for a linearized steady-state*
(664) *fluid-nonlinear elasticity interaction.*
Lorena Bociu*, University of
Nebraska-Lincoln, and **Jean-Paul Zolesio**,
INRIA, Sophia Antipolis Cedex, France
(1067-35-406)

AMS Special Session on Groups, Geometry, and Applications, I

8:00 AM – 11:50 AM   **Borgne Room, 3rd Floor, Sheraton**

Organizer: **Delaram Kahrobaei**, City University of New York

8:00AM *Subgroup distortion and bounded*
(665) *cohomology.*
Indira Chatterji*, Orléans (France) and OSU, **Guido Mislin**, ETHZ and OSU, **Christophe Pittet**, Marseille (France), and **Laurent Saloff-Coste**, Cornell University (1067-20-1346)

8:30AM *Hyperbolic Surface Subgroups of*
(666) *One-ended Doubles of Free Groups.*
Sang-hyun Kim*, Tufts University/KAIST, and **Sang-il Oum**, KAIST (1067-20-1187)

9:00AM *Pushing fillings in right-angled Artin*
(667) *groups.*
Aaron Abrams, Emory University, **Noel Brady**, University of Oklahoma, **Pallavi Dani***, Louisiana State University, **Moon Duchin**, Univerisity of Michigan, and **Robert Young**, IHES (1067-20-1806)

9:30AM *Generic Properties of Groups and Surface*
(668) *Subgroups.* Preliminary report.
Sang-hyun Kim, Tufts University, and **Paul E. Schupp***, University of Illinois, Stevens Institute of Technology (1067-20-1709)

10:00AM *Infinite words and groups.*
(669) **Alexei Miasnikov**, Stevens Institute of Technology (1067-20-1095)

11:00AM *Groups with a quasiconvex hierarchy.*
(670) **Mark F Hagen**, McGill University (1067-20-526)

11:30AM *Involutions and the word length of the*
(671) *Mobius group.*
Ara S. Basmajian, CUNY, Graduate center and Hunter college (1067-30-367)

MAA Minicourse #3: Part A

8:00 AM – 10:00 AM   **Ile de France I, 3rd Floor, JW Marriott**

Geometry and algebra in mathematical music theory.

Organizers: **Thomas M. Fiore**, University of Michigan-Dearborn

              Dmitri Tymoczko, Department of Music, Princeton University

              Robert Peck, School of Music, Louisiana State University

AMS Session on Optimization, Game Theory, and Applications of Mathematics

8:00 AM – 11:55 AM   **Cornet Room, 8th Floor, Sheraton**

8:00AM *Asset Price Dynamics: Differential*
▶ (672) *Equations and Instability.*
Mark DeSantis, University of Pittsburgh (1067-37-1693)

8:15AM *Hybrid Runge-Kutta and Quasi-Newton*
(673) *Algorithms.*
Darin Mohr, The University of Iowa (1067-90-1965)

8:30AM *Lower Bounds for the Ropelength of*
▶ (674) *Reduced Conformations.*
Robert Douglas McGuigan, San Jose State University (1067-00-386)

8:45AM *An Effective Method for Replenishing*
▶ (675) *Items with Seasonal Intermittent Demand.*
Meike Niederhausen* and **Gary Mitchell**, University of Portland (1067-90-2005)

9:00AM *Sparsity Optimization with Applications*
(676) *in Bioscience.* Preliminary report.
Sarah A King, North Carolina State University (1067-90-2142)

9:15AM *Nash equilibria in a one-dimensional*
▶ (677) *dispersion game.*
Arash Enayati Khorzoghi, Carnegie Mellon University (1067-91-1559)

9:30AM *Evolutionary Game Theory on Measure*
(678) *Spaces.*
John M Cleveland*, Penn State (University Park) StateCollege, PA, and **Azmy S Ackleh**, University of Louisiana at Lafayette (1067-91-1819)

9:45AM *Cascading Behavior in Networks: A Game*
▶ (679) *Theory Approach to Modeling Voting Behavior.* Preliminary report.
Jim C. Manning*, University of South Carolina, and **Margaret Cozzens**, DIMACS, Rutgers University (1067-91-2128)

10:00AM *The Borda Count, the Kemeny Rule, and*
▶ (680) *the Permutahedron.*
Karl-Dieter Crisman, Gordon College (1067-91-234)

10:15AM *Braess's Paradox in Random Graphs.*
(681) **Stephen J. Young*** and **Fan Chung**, University of California, San Diego (1067-91-2021)

10:30AM *An Analysis of the U.S. Consumer Price*
▶ (682) *Index –An Application of the ARMA and the GARCH Model.* Preliminary report.
Qi Sun, Lafayette College (1067-91-153)

10:45AM *Agent-based Asset Pricing Dynamics with*
▶ (683) *incomplete market in Lucas Framework.* Preliminary report.
Yuanying Guan, Florida State University (1067-91-1112)

11:00AM ► (684) *An Agent-Based Modeling Approach to Financial Markets.* **William K Brayer**, Georege Mason (1067-91-1473)

11:15AM ► (685) *A Stability Study of Asset Price Equilibrium Models.* Preliminary report. **Arjun Sanghvi**, George Mason University (1067-91-1721)

11:30AM ► (686) *Options pricing with transaction costs and stochastic volatility.* Preliminary report. **Emmanuel Kengni Ncheuguim***, New Mexico State University, and **Maria Mariani**, University of Texas at El Paso (1067-91-1884)

11:45AM ► (687) *Martingale properties of the wealth process in a spin market model.* Preliminary report. **Yilun Dong***, Swarthmore College, and **Ted Theodosopoulos**, Saint Ann's School (1067-91-1919)

AMS Session on Combinatorics and Graph Theory, V

8:00 AM – 11:55 AM **Southdown Room, 4th Floor, Sheraton**

8:00AM ► (688) *Degree sequences and graphs with disjoint spanning trees.* **Hong-Jian Lai**, **Yanting Liang*** and **Ping Li**, West Virginia University (1067-05-536)

8:15AM ► (689) *Hypercube orientations with only two in-degrees.* **Joe Buhler**, CCR, La Jolla, **Steve Butler***, UCLA, **Ron Graham** and **Eric Tressler**, UCSD (1067-05-1463)

8:30AM (690) *Minimal Percolating Sets in the Hypercube and Related Graphs.* **Emily Berger**, Massachusetts Institute of Technology (1067-05-2226)

8:45AM (691) *Unifying Laver's Theorem and the Graph Minor Theorem via Proof System Minors.* **Christian Joseph Altomare**, The Ohio State University (1067-05-2295)

9:00AM (692) *Generating Planar Quintangulations.* Preliminary report. **Jianning Su***, **Jinko Kanno**, Louisiana Tech University, and **Ko Yamamoto**, Yokohama National University (1067-05-1944)

9:15AM ► (693) *An intuitively appealing axiomatization of the median procedure on median graphs.* **Beth A Novick***, Clemson University, and **Henry Martyn Mulder**, Econometrisch Instituut, Erasmus Universiteit (1067-05-1713)

9:30AM (694) *Decomposition of sparse graphs using forests and a graph with bounded degree.* **Seog-Jin Kim**, Konkuk University, South Korea, **Alexandr V. Kostochka**, **Douglas B. West**, **Hehui Wu***, University of Illinois at Urbana-Champaign, and **Xuding Zhu**, Zhejiang Normal University, China (1067-05-1114)

9:45AM (695) *A Characterization of the Centers of Chordal Graphs.* **James Michael Shook*** and **Bing Wei**, University of Mississippi (1067-05-957)

10:00AM (696) *Spherical Tiling by 12 Congruent Pentagons.* **Min Yan***, **Honghao Gao** and **Nan Shi**, Hong Kong University of Science and Technology (1067-05-801)

10:15AM (697) *Oriented Hypergraphs and the Structure of Rational Matrices.* **Lucas J. Rusnak**, Binghamton University (1067-05-32)

10:30AM (698) *Bicircular Matroids with Circuits of a Single Size.* **Torina Deachune Lewis***, **Talmage James Reid** and **Laura Sheppardson**, The University of Mississippi (1067-05-2297)

10:45AM ► (699) *L(2,1) Labeling of Graphs of Bounded Bandwidth and Permutation Graphs.* Preliminary report. **Ellen Panofsky***, Cabrini College, and **Garth Isaak**, Lehigh University (1067-05-1597)

11:00AM ► (700) *Edge switching on colored degree sequences.* **Hannah Alpert***, University of Chicago, **Amariah Becker**, Carleton College, **James Hilbert**, Lafayette College, **Jennifer Iglesias**, Harvey Mudd College, and **Garth Isaak**, Lehigh University (1067-05-591)

11:15AM ► (701) *A Variation on Kundu's Theorem.* **Hannah Alpert**, University of Chicago, **Amariah Becker**, Carleton College, **James Hilbert**, Lafayette College, **Jennifer Iglesias***, Harvey Mudd College, and **Garth Issak**, Lehigh University (1067-05-615)

11:30AM ► (702) *Obstacle Numbers of Graphs.* **Hannah Alpert**, University of Chicago, **Christina Koch**, Academy of Hope, and **Joshua D Laison***, Willamette University (1067-05-1359)

11:45AM ► (703) *"Graphic" Degree Sequences for Edge-Colored Graphs.* **Amariah D. Becker***, Carleton College, **Hannah Alpert**, University of Chicago, **James Hilbert**, Lafayette College, and **Jenny Iglesias**, Harvey Mudd College (1067-05-704)

MAA Session on Alternative Approaches to Traditional Introductory Statistics Courses, I

8:00 AM – 11:55 AM   **Great Ballroom E, 5th Floor, Sheraton**

Organizers: **Brian T. Gill**, Seattle Pacific University

Nancy J. Boynton, SUNY Fredonia

Michael A. Posner, Villanova University

8:00AM
► (704)
Confounding the Traditional Introductory Statistics Course.
Daniel T Kaplan, Macalester College (1067-B1-1002)

8:20AM
► (705)
Online discussions boards: An attempt to foster student interaction and engagement in an online Introductory Statistics course.
Sheldon H Lee, Viterbo University (1067-B1-2359)

8:40AM
► (706)
Teaching Critical Thinking in a Statistical Literacy Course Using Odysseys2Sense: a Web-Based Discussion Forum. Preliminary report.
Milo Schield, W. M. Keck Statistical Literacy Project (1067-B1-51)

9:00AM
► (707)
Papers? - in a math class? Using essays and online discussion groups to improve an Introductory Statistics course. Preliminary report.
Edwin P Herman, University of Wisconsin-Stevens Point (1067-B1-1600)

9:20AM
► (708)
Using group quizzes in an online introductory statistics course. Preliminary report.
Audbjorg Bjornsdottir* and **Joan Garfield**, University of Minnesota (1067-B1-2057)

9:40AM
(709)
Teaching an online Statistics Class for Education Major.
Kumer Pial Das*, **Md. Shamim Sarker** and **AKM Saiful Islam**, Lamar University (1067-B1-1862)

10:00AM
► (710)
A Biology-Emphasis Elementary Statistics Course in a Small, Liberal Arts College Setting.
William R Harris, Georgetown College (1067-B1-840)

10:20AM
► (711)
Applied Statistics for Non-Traditional Undergraduate Business Majors (An Introductory Statistics Course). Preliminary report.
Michael D. Miner, American Public University System (1067-B1-1858)

10:40AM
► (712)
Teaching Introductory Statistics in Thirteen Formats. Preliminary report.
Anant Godbole, East Tennessee State University (1067-B1-27)

11:00AM
(713)
Mathematics and the Law: Beyond People v. Collins.
Jeff Suzuki, Brooklyn College (1067-B1-376)

11:20AM
(714)
Data Visualization in Introductory Statistics.
Max Buot, Xavier University (1067-B1-2349)

11:40AM
(715)
Statistics for the Millenial Learner.
Gina F Reed, Gainesville State College (1067-B1-1025)

MAA Session on Cool Calculus: Lessons Learned Through Innovative and Effective Supplemental Projects, Activities, and Strategies for Teaching Calculus

8:00 AM – 11:35 AM   **Grand Chenier Room, 5th Floor, Sheraton**

Organizer: **Jessica M. Deshler**, West Virginia University

8:00AM
► (716)
Sharks, Minnows and Wheelbarrows: Calculus Modeling Projects.
Michael D Smith, Hollins University (1067-C1-357)

8:20AM
► (717)
Use of Open-Ended Problems in Multivariable Calculus.
Sarah L Mabrouk, Framingham State University (1067-C1-2362)

8:40AM
► (718)
Overcoming Conflicting Imagery in the Development of an Understanding of Taylor Series Convergence.
Jason H Martin*, Arizona State University, and **Michael C Oehrtman**, University of Northern Colorado (1067-C1-2274)

9:00AM
► (719)
Playing with Multivariable Calculus Concepts Wearing 3D Glasses. Preliminary report.
Paul E Seeburger, Monroe Community College (1067-C1-1647)

9:20AM
► (720)
Maplets for Calculus: Effective Teaching and Studying Resources for Calculus Students.
Philip B Yasskin*, Texas A&M University, and **Douglas B Meade**, University of South Carolina (1067-C1-1457)

9:40AM
► (721)
Using Differentials to Teach Calculus Coherently.
Tevian Dray, Oregon State University (1067-C1-2352)

10:00AM
(722)
Putting the Cart before the Horse? Teaching Differentiation Rules as "Review" in First Semester Calculus.
Nathan M Wodarz, University of Wisconsin - Stevens Point (1067-C1-397)

10:20AM
► (723)
Using Modeling and Differential Equations with a Numerical Solver to Teach First Year Calculus. Preliminary report.
Brian Birgen* and **Mariah Birgen**, Wartburg College (1067-C1-251)

10:40AM
(724)
Calculus in large lectures: Pedagogy through technology. Preliminary report.
Amit A Savkar* and **Fabiana A Cardetti**, University of Connecticut (1067-C1-1662)

11:00AM *Engaging students through the use of the*
(725) *online homework system WeBWorK.*
Preliminary report.
Anneke Bart, Saint Louis University
(1067-C1-986)

11:20AM *A Hands-On Approach To Calculus.*
(726) **Mike Long**, Shippensburg University
(1067-C1-1951)

MAA Session on Modeling in the ODE Driver's Seat

8:00 AM – 10:55 AM   **Grand Couteau Room, 5th Floor, Sheraton**

Organizers: **Kurt Bryan**, Rose-Hulman Institute of Technology

Brian J. Winkel, U. S. Military Academy

8:00AM *Comparing an Applications-first*
▶ (727) *Approach and an Analytic Techniques-first Approach to Teaching Topics in Differential Equations.*
Preliminary report.
Jennifer Ann Czocher, The Ohio State University (1067-R1-1680)

8:20AM *Mathematical Modeling of*
▶ (728) *"hearts and minds" in the Terrorism/Counter-Terrorism Struggle.*
Chris Arney, United States Military Academy (1067-R1-237)

8:40AM *Making Differential Equations More*
▶ (729) *Relevant to Electrical Engineering Technology Students.*
Yajun Yang, Farmingdale State College of SUNY (1067-R1-1796)

9:00AM *Cartilage Regeneration in Cell-Seeded*
▶ (730) *Scaffolds: An ODE Modeling Approach.*
Preliminary report.
Janine M Haugh, University of North Carolina at Asheville (1067-R1-2323)

9:20AM *ODE Models in Medicine.*
▶ (731) **Lester F Caudill**, University of Richmond (1067-R1-1973)

9:40AM *Calibrating, Simulating, and Evaluating*
(732) *an Exposure-Effects Model for Fish Growth.*
Rachael Miller Neilan, Louisiana State University (1067-R1-118)

10:00AM *Modeling Malaria in Central America.*
▶ (733) Preliminary report.
Michael Huber, Muhlenberg College (1067-R1-380)

10:20AM *An Ode to Modeling with ODEs.*
▶ (734) **Kimberly R. Swetz**, United States Air Force Academy (1067-R1-1504)

10:40AM *A Week in the Life of an Inquiry-Based*
▶ (735) *ODEs Course.* Preliminary report.
Elizabeth Thoren, University of California, Santa Barbara (1067-R1-1542)

MAA General Contributed Paper Session, V

8:00 AM – 11:55 AM   **St. Claude, 3rd Floor, JW Marriott**

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

8:00AM *A History of Math Seminar Course for*
▶ (736) *Future Secondary Teachers.* Preliminary report.
Kate G McGivney, Shippensburg University (1067-Z1-2035)

8:15AM *Pre-Service Teachers in the College*
▶ (737) *Classroom-A Mentoring Experience.*
Gary A. Olson, University of Colorado Denver (1067-Z1-2259)

8:30AM *Improving Elementary Teacher*
▶ (738) *Mathematics Preparation at Fitchburg State University.* Preliminary report.
Mary Ann Barbato, Fitchburg State University (1067-Z1-1488)

8:45AM *Improving Student Success on PRAXIS II*
▶ (739) *(Mathematical Content).*
Kenneth J Bernard, Virginia State University (1067-Z1-1947)

9:00AM *An Experiment in Student Centered*
▶ (740) *Learning.* Preliminary report.
Laurie Lenz, Marymount University (1067-Z1-1949)

9:15AM *Project Group Student Selection: Using*
▶ (741) *Prior Academic Performance to Improve Group Dynamics.*
J. Kingsley Fink, United States Military Academy (1067-Z1-2043)

9:30AM *Adventures with Cooperative Learning*
▶ (742) *and standards-based grading in the college classroom (or, how I tried to re-program myself to teach in only one semester).* Preliminary report.
Bret Jordan Benesh, College of St. Benedict/St. John's University (1067-Z1-1449)

9:45AM *Proactively Preventing Project*
▶ (743) *Procrastination.* Preliminary report.
James A Jones*, **Elizabeth W Schott**, **Stanley F Florkowski** and **Brian J Lunday**, United States Military Academy (1067-Z1-2033)

10:00AM *Maximizing the Benefit of a Review*
▶ (744) *Session Using an Informal Collaborative Group Format.*
A. S. Elkhader, Northern State University (1067-Z1-742)

10:15AM *Improving Support for Undergraduate*
▶ (745) *Math Tutors.* Preliminary report.
Rachel Esselstein, California State University, Monterey Bay (1067-Z1-1162)

10:30AM *Mentoring Undergraduate Research for*
▶ (746) *All Mathematics Majors.*
Jeffrey W Clark, Elon University (1067-Z1-89)

10:45AM ► (747) *Two Different Approaches to Getting Students Involved in Writing Proofs.* Preliminary report.
Martin E. Flashman, Humboldt State University (1067-Z1-1399)

11:00AM ► (748) *The "More" Method of Teaching Proofs.* **Robert L Brabenec**, Wheaton College IL (1067-Z1-292)

11:15AM ► (749) *Teaching Techniques and Activities that Encourage Proof Writing.* Preliminary report.
Violeta Vasilevska, Utah Valley University (1067-Z1-1572)

11:30AM ► (750) *How Do You Get Students Involved in Writing Proofs? One (Method) at a Time.* Preliminary report.
Stan Perrine, Charleston Southern University (1067-Z1-928)

11:45AM ► (751) *Doing It Yourself: Writing Your Own Textbook.*
James E. Hamblin, Shippensburg University (1067-Z1-1300)

SIAM Minisymposium on Combinatorial Optimization, I

8:00 AM – 10:55 AM   **Bayside A, 4th Floor, Sheraton**

Organizers: **David Hartvigsen**, University of Notre Dame
Donald Wagner, Office of Naval Research

8:00AM (752) *A PTAS for matroid matching.* **Jon Lee**, IBM TJ Watson Research Center (1067-68-533)

8:30AM (753) *Finding 2-factors covering 3- and 4-edge cuts in bridgeless cubic graphs.* **Sylvia Boyd**, University of Ottawa, **Satoru Iwata*** and **Kenjiro Takazawa**, Kyoto University (1067-90-887)

9:00AM (754) *Matching preclusion and conditional matching preclusion problems for regular graphs.* **Eddie Cheng***, **Laszlo Liptak**, Oakland University, **Marc J Lipman**, Indiana University Purdue University - Fort Wayne, **Philip Hu**, Yale University, and **Roger Jia**, University of Michigan (1067-05-333)

9:30AM (755) *Computing Matroidal Branchwidth.* **Illya V. Hicks**, Rice University (1067-90-1054)

10:00AM (756) *Primal-Dual Algorithms for Weighted Abstract Flow and Weighted Abstract Cut Packing.* **S. Thomas McCormick***, Sauder School of Business, UBC, Vancouver, **Maren Martens**, ZIB Berlin, and **Britta Peis**, TU Berlin (1067-90-806)

10:30AM (757) *Delta-Wye Reduction of Almost-Planar Graphs.* **Don Wagner**, Office of Naval Research (1067-05-920)

Employment Center

8:00 AM – 7:00 PM   **Preservation Hall, 2nd Floor, Marriott**

AMS Session on Geometry

8:15 AM – 11:55 AM   **Bayside B, 4th Floor, Sheraton**

8:15AM ► (758) *Using Cantor Sets to Study the Connectivity of Sierpiński Relatives.* **Tara D Taylor**, St. Francis Xavier University (1067-51-699)

8:30AM ► (759) *On Exceptional Points of Cocompact Fuchsian Groups.* Preliminary report. **Joseph Fera**, Wesleyan University (1067-51-948)

8:45AM ► (760) *An Introduction to Generalized Parabolas I.* Preliminary report. **Gregory N Hartman*** and **Daniel S Joseph**, Virginia Military Institute (1067-51-975)

9:00AM (761) *An Introduction to Generalized Parabolas II.* **Daniel S Joseph*** and **Gregory N Hartman**, Virginia Military Institute (1067-51-976)

9:15AM (762) *On the Generalizations of the Polar Moments of Inertia under the Homothetic Motions.* **Mutlu Akar*** and **Salim Yuce**, Yildiz Technical University (1067-51-1616)

9:30AM (763) *Prime Paths in Graph Coverings and a Chebotarev Density-type Result.* **Thomas Anthony Petrillo**, University of Toledo (1067-51-1841)

9:45AM (764) *Morley $i\triangle$, Morley $e\triangle$, and their Mother Triangle.* **Shing S So**, University of Central Missouri (1067-51-1996)

10:00AM (765) *Einstein Submanifolds in a Kahler Space Form.* **Matthew Drury**, Indiana University (1067-51-2031)

10:15AM ► (766) *Symmetry Analysis of Howe's Patterns.* Preliminary report. **Dennis Glenn Collins**, Winamac, IN (1067-51-2278)

10:30AM ► (767) *Perimeter-Minimizing Tilings with Penalties for Vertices.* Preliminary report. **Michael T Mara***, Williams College, **Yifei Li**, Berea College, **Elena Wikner**, Williams College, and **Isamar Rosa**, University of Puerto Rico at Mayaguez (1067-51-2372)

10:45AM (768) *On closed sets with convex shadows in Hilbert space.* **Stoyu Barov**, Bulgarian Academy of Sciences, and **Jan J. Dijkstra***, Vrije Universiteit Amsterdam (1067-52-985)

11:00AM ► (769) *Experiments in monotone kinetic visibility.* Preliminary report. **Lily Du**, **Stefanie Wang** and **Yonit Bousany***, Smith College (1067-52-1141)

11:15AM *Heesch Numbers of Polyforms with Edge*
▶ (770) *Matching Rules.* Preliminary report.
Casey Mann, The University of Texas at
Tyler (1067-52-1772)

11:30AM *Classifying Voronoi Graphs of Hex*
(771) *Spheres.*
Aldo-Hilario Cruz-Cota, Grand Valley
State University (1067-54-1349)

11:45AM *Stick Numbers in the Simple Hexagonal*
(772) *Lattice.*
Jennifer McLoud-Mann*, **Casey Mann**
and **David Milan**, University of Texas at
Tyler (1067-54-1521)

AMS Special Session on Expander Graphs in Pure and Applied Mathematics, II

8:30 AM – 11:15 AM **Frontenac, 3rd Floor, JW Marriott**

Organizers: **Alireza Salehi Golsefidy**, Princeton University

Alexander Lubotzky, Hebrew University of Jerusalem

8:30AM *Asymptotic phenomena in geometric*
(773) *group theory.*
Igor Rivin, Institute for Advanced Study
and Temple University (1067-05-1682)

9:00AM *Expander graphs, gonality, and Galois*
(774) *representations.*
Jordan S Ellenberg*, University of
Wisconsin, **Christopher J Hall**, University
of Wyoming, and **Emmanuel Kowalski**,
ETH (1067-14-1182)

9:30AM *Affine sieve and expansion in perfect*
(775) *groups.*
Alireza Salehi Golsefidy*, **Peter Sarnak**
and **Peter Varju**, Princeton University
(1067-11-678)

10:00AM *Pseudorandom Financial Derivatives*
▶ (776) *from Expander Graphs.*
David Zuckerman, University of Texas at
Austin (1067-91-777)

10:30AM *Expanders and K-theory for discrete*
(777) *groups.*
Paul Frank Baum, Penn State University
(1067-19-185)

AMS Session on Rings and Algebras

8:30 AM – 11:55 AM **La Galerie 5, 2nd Floor, Marriott**

8:30AM *Constructing Quadratic Quantum* $\mathbb{P}^2s$
(778) *from Graded Skew Clifford Algebras.*
Manizheh Nafari*, **Michaela Vancliff**
and **Jun Zhang**, University of Texas at
Arlington (1067-16-453)

8:45AM *A Notion of Rank for Noncommutative*
(779) *Quadratic Forms.*
Padmini P Veerapen, University of
Texas, Arlington (1067-16-1068)

9:00AM *Covered Groups and Simple Rings.*
(780) **G. Alan Cannon**, Southwestern
Louisiana University, **Lucyna Kabza**,
Southeastern Louisiana University, **C. J.
Maxson**, Texas A&M University, and **Kent
M. Neuerburg***, Southeastern Louisiana
University (1067-16-1485)

9:15AM *Weak crossed product orders over*
(781) *discrete valuation rings.* Preliminary
report.
Christopher J Wilson, Butler University
(1067-16-137)

9:30AM *Category $\mathcal{O}$ for the Rational Cherednik*
(782) *Algebra of* G_{12}.
Christopher R Policastro, MIT
(1067-16-493)

9:45AM *Good Gradings from Relations.*
(783) Preliminary report.
Kenneth L Price, University of Wisconsin
Oshkosh (1067-16-989)

10:00AM *The* $\mathcal{K}_2$ *Property for Face Rings.*
(784) Preliminary report.
Andrew Conner, University of Oregon
(1067-16-1815)

10:15AM *Fusion Rules for Abelian Extensions of*
(785) *Hopf Algebras.*
Christopher Goff, University of the
Pacific (1067-16-1743)

10:30AM *Structural results for the Yoneda*
(786) *algebra of a connected-graded algebra.*
Preliminary report.
Christopher Lee Phan, Bucknell
University (1067-16-2020)

10:45AM *Two-sided ideals in Leavitt path algebras.*
(787) **Pinar Colak**, Simon Fraser University
(1067-16-2367)

11:00AM *Minimal Non-Elementary Lie Algebra.*
(788) Preliminary report.
Kristen L Stagg* and **Ernest
L Stitzinger**, North Carolina State
University (1067-17-902)

11:15AM *Nontrivial Schur Multipliers of Nilpotent*
(789) *Lie Algebras.*
Lindsey R Bosko, North Carolina State
University (1067-17-1804)

11:30AM *On Wakimoto representations of* $\hat{sl}_2$ *and*
(790) **Z**-*algebras.* Preliminary report.
Jonathan D Dunbar, North Carolina
State University (1067-17-1808)

11:45AM *Automorphisms on Albert-like Semifield*
▶ (791) *Planes.* Preliminary report.
Angela M. Brown, University of Texas at
Arlington (1067-17-1722)

AMS Session on Numerical Analysis, I

8:30 AM – 11:55 AM **La Galerie 1, 2nd Floor, Marriott**

8:30AM *Linear and Nonlinear Inverse Problems.*
▶ (792) Preliminary report.
Antoine V Elabdouni, University of
California, Berkeley (1067-00-1440)

8:45AM *Finding the optimal L2 regularization.*
(793) **Zhuojun Magnant***, Emory University, and **Eldad Haber**, UBC (1067-65-80)

9:00AM *Finite Element Approximations of*
(794) *Stochastic Optimal Control Problems Constrained by Stochastic Elliptic PDEs.*
Jangwoon (Leo) Lee*, University of Mary Washington, **L. S. Hou**, Iowa State University, and **H. Manouzi**, Laval University (1067-65-1920)

9:15AM *On correct boundary conditions in*
(795) *numerical schemes for the shallow water equations.*
Andrei Bourchtein* and **Ludmila Bourchtein**, Pelotas State University, Brazil (1067-65-354)

9:30AM *A Numerical Model of Fracture using*
▶ (796) *Curvature Dependent Surface Tension.*
Lauren A. Ferguson, Texas A&M University (1067-65-396)

9:45AM *Stability of equilibria in one dimension*
▶ (797) *for diblock copolymer equation.* Preliminary report.
Olga Stulov*, State University of New York at New Paltz, **Ian C Johnson**, **Evelyn Sander** and **Thomas Wanner**, George Mason University (1067-65-651)

10:00AM *A Simple Parallel Implementation of the*
▶ (798) *Finite Element Method Using Linear Geometries.*
Robert D French*, **Casey L McKnight** and **Ben Ntatin**, Austin Peay State University (1067-65-1837)

10:15AM *Local Error Estimates of the LDG*
(799) *Method for One-Dimensional Singularly Perturbed Convection-diffusion Equations.*
Huiqing Zhu*, The University of Southern Mississippi, and **Zhimin Zhang**, Wayne State University (1067-65-827)

10:30AM *Additive Schwarz preconditioners for the*
(800) *local discontinuous Galerkin method.*
Andrew T. Barker*, **Susanne C. Brenner** and **Li-Yeng Sung**, Louisiana State University (1067-65-1016)

10:45AM *Hodge Decomposition and Maxwell's*
(801) *Equations.*
Jintao Cui, Louisiana State University (1067-65-87)

11:00AM *Approximate worm blankets using*
▶ (802) *segmented worms.*
James M Rath, Austin, TX (1067-65-1181)

11:15AM *A new junction model for gas flow*
(803) *through a splitting pipe.*
J. B. Collins, North Carolina State University (1067-65-1302)

11:30AM *A Branch and Bound Process for*
(804) *Singular Global Optimization Problems - Preliminary Explorations.* Preliminary report.
Julie Roy*, Metropolitan State College of Denver, and **R. Baker Kearfott**, University of Louisiana at Lafayette (1067-65-2069)

11:45AM *A Sequential Operator Splitting Method*
▶ (805) *for Maxwell's Equations in Debye Dispersive Media.* Preliminary report.
Aubrey L Leung* and **Vrushali A Bokil**, Oregon State University (1067-65-2210)

AMS Session on Partial Differential Equations, I

8:30 AM – 10:55 AM   Balcony N, 4th Floor, Marriott

8:30AM *Bifurcation of Internal Transition*
(806) *Layers for Spatially Inhomogeneous reaction-diffusion equation.*
Chaoqun Huang* and **Aaron Nung Kwan Yip**, Purdue University (1067-35-600)

8:45AM *A numerical and analytical study of a*
(807) *variable-type equation.*
M Affouf, Kean University (1067-35-1416)

9:00AM *Finite element approximation of reaction*
(808) *diffusion systems on arbitrary surfaces.*
Necibe Tuncer, University of Florida (1067-35-853)

9:15AM *Positive Solutions for an Elliptic Bi-variate*
(809) *Reaction Systems with Combined Nonlinear Effects.*
Jaffar Ali*, Florida Gulf Coast University, and **Ratnasingham Shivaji**, Mississippi State University (1067-35-450)

9:30AM *Explicit Solutions for Optimal Portfolio*
(810) *and Consumption with Transaction Costs.*
Harumi Hattori and **Zheng Zhang***, West Virginia University (1067-35-869)

9:45AM *Nonclassical symmetries of a*
▶ (811) *reaction-diffusion equation with a quadratic nonlinearity.*
Danny Arrigo*, **David Ekrut**, **Long Le** and **Sang Lee**, University of Central Arkansas (1067-35-2191)

10:00AM *A Globally Convergent Numerical Method*
(812) *for Coefficient Inverse Problems with Applications in Thermal Tomography.*
Aubrey Rex Rhoden*, University of Texas in Arlington, and **Natee Pantong**, University of North Carolina in Charlotte (1067-35-2096)

10:15AM *Recovery of an Interface from Boundary*
(813) *Measurement in an Elliptic Differential Equation.*
Weifu Fang and **Suxing Zeng***, Wright State University (1067-35-934)

10:30AM *Parameter Estimation for Damped*
▶ (814) *Sine-Gordon Equation with Neumann Boundary Condition.*
Narayan Thapa, Minot State University (1067-35-114)

10:45AM *Global Solvability for the Heat Equation*
(815) *with Boundary Flux Governed By Nonlinear Memory.*
Jeffrey R. Anderson, University of Wisconsin-Stout, **Keng Deng** and **Zhihua Dong***, University of Louisiana at Lafayette (1067-35-956)

AMS Session on Finite Differences and Functional Equations

8:45 AM – 11:55 AM Rosalie, 3rd Floor, JW Marriott

8:45AM *Formal power series solutions of*
(816) *Schröder's functional equation.*
Ruth D Enoch, Arkansas Tech University
(1067-39-1690)

9:00AM *Oscillation of Impulsive Differential*
(817) *Equations with Piecewise Constant*
Argument.
Fatma Karakoc*, **Huseyin Bereketoglu**
and **Gizem Seyhan**, Ankara University
(1067-39-300)

9:15AM *Existence Theorem for Set-Valued*
(818) *Differential Inclusion Using the*
Pseudo-integral in Pseudo-analysis.
Preliminary report.
Priscilla Supnet Macansantos,
University of the Philippines Baguio,
Baguio City, Philippines (1067-39-1069)

9:30AM *Nonlinear Discrete Sturm-Liouville*
(819) *Problems with Global Boundary*
Conditions.
Jesus Rodriguez and **Zachary**
Abernathy*, NC State University
(1067-39-2341)

9:45AM *Non-local boundary value problems for*
(820) *discrete systems.*
Kristen Abernathy* and **Jesus**
Rodriguez, North Carolina State
University (1067-39-2141)

10:00AM *Systems of Difference Equations,*
▶ (821) *Oscillations, and Sturmian Sequences.*
Preliminary report.
Mojtaba Moniri, Western Illinois
University (1067-39-195)

10:15AM *Convergence of Solutions of*
(822) *Nonhomogeneous Linear Difference*
Systems with Delays.
Huseyin Bereketoglu*, Ankara
University, and **Aydin Huseynov**,
Institute of Mathematics and Mechanics,
Azerbaijan National Academy of Sciences
(1067-39-301)

10:30AM *Invariant Manifolds for Competitive*
(823) *Discrete Systems in the Plane -*
Non-hyperbolic Case.
M. R. S. Kulenovic, University of Rhode
Island (1067-39-1251)

10:45AM *Applications of System of Logistic*
(824) *Difference Equations in agriculture.*
Tamara Yevgenia Awerbuch*, **Richard**
Levins, Harvard School of Public Health,
Michael A Radin, Rochester Institute of
Technology, **Candace M Kent**, Virginia
Commonwealth University, and **Vlajko**
Kocic, Xavier University of Louisiana
(1067-39-1617)

11:00AM *Asymptotic behavior of solutions to*
(825) *difference equations involving ratios of*
elementary symmetric polynomials.
Austin H Jones* and **Kenneth S**
Berenhaut, Wake Forest University
(1067-39-2404)

11:15AM *Local data of a Linear Difference*
(826) *Operator.*
Yongjae Cha, Florida State University
(1067-39-2064)

11:30AM *Competitive exclusion in a discrete*
(827) *juvenile-adult model with continuous and*
seasonal reproduction.
Ross A Chiquet* and **Azmy S Ackleh**,
University of Louisiana, Lafayette
(1067-39-1634)

11:45AM *Modeling Interactions Among Fish,*
▶ (828) *Fishermen and Fish-Eating Bird*
Populations.
Robert R. Ferdinand*, **Matthew M.**
Donica, **James K. Gordon**, **Laura E.**
Johnson and **Jessica L. Pitts**, East
Central University (1067-39-16)

MAA Invited Address

9:00 AM – 9:50 AM Great Ballroom A-C, 5th Floor, Sheraton

(829) *Sea battles, Benjamin Franklin's oil lamp,*
and jellybellies.
Katherine Socha, Saint Mary's College of
Maryland (1067-A0-40)

MAA Invited Paper Session on The Beauty and Power of Number Theory

9:00 AM – 11:55 AM Rhythms II and III, 2nd Floor, Sheraton

Organizers: **Thomas Koshy**,
Framingham State University
Shannon Lockard,
Bridgewater State College

9:00AM *Euler's pentagonal numbers theorem,*
▶ (830) *companions and variations.*
Krishnaswami Alladi, University of
Florida (1067-AC-1067)

9:45AM *The Takagi function.*
(831) **Jeffrey C. Lagarias**, University of
Michigan (1067-AC-297)

10:30AM *Using finite fields to prove things about*
(832) *the complex numbers.*
Van H. Vu, Rutgers University, **Melanie**
Matchett Wood*, American Institute of
Mathematics and Stanford University, and
Philip Matchett Wood, Stanford
University (1067-AC-531)

11:15AM *Landau's Class Number Theorem: A Gem*
(833) *That Wasn't.* Preliminary report.
H. M. Stark, UCSD (1067-AC-1058)

MAA Minicourse #12: Part A

9:00 AM – 11:00 AM   Ile de France III,
3rd Floor, JW Marriott

Concepts, data, and models: College algebra for the real world.
Organizers: **Sheldon P. Gordon**, Farmingdale State College
Florence S. Gordon, New York Institute of Technology

MAA Minicourse #6: Part A

9:00 AM – 11:00 PM   Ile de France II,
3rd Floor, JW Marriott

Green linear optimization.
Organizer: **Glenn H. Hurlbert**, Arizona State University

SIGMAA RUME Session on Research on the Teaching and Learning of Undergraduate Mathematics, I

9:00 AM – 11:55 AM   St. Jerome, 3rd
Floor, JW Marriott

Organizers: **Sean Larsen**, Portland State University
Natasha M. Speer, University of Maine
Stacy Brown, Pitzer College

9:00AM *Enhancing Student Understanding of the*
▶ (834) *Concept of Limit via Instructional Provocations.*
Kyeong Hah Roh and **Aviva Halani***, Arizona State University (1067-Z5-1357)

9:20AM *Creating, Using and Interpreting Vectors*
(835) *and Vector Equation in a Classroom Community of Practice.*
George F. Sweeney, San Diego State University/UCSD (1067-Z5-2017)

9:40AM *The Impact of the Spacing Effect and*
▶ (836) *Overlearning on Student Performance in Calculus.*
Nicholas Gorgievski*, Nichols College, and **Thomas C DeFranco**, University of Connecticut (1067-Z5-1007)

10:00AM *Set-oriented Thinking and the Evaluation*
▶ (837) *of Alternative Solutions in Counting Problems.* Preliminary report.
Elise Lockwood, Portland State University (1067-Z5-1438)

10:20AM *University Calculus Instructors and*
▶ (838) *Students' discourses on the derivative.*
Preliminary report.
Jungeun Park*, Micigan State University, and **Sharon Senk**, Michigan State University (1067-Z5-1084)

10:40AM *How mathematicians use diagrams to*
(839) *construct proofs.*
Aron Samkoff*, Rutgers University, **Yvonne Lai**, University of Michigan, and **Keith Weber**, Rutgers University (1067-Z5-1798)

11:00AM *Quantitative Reasoning and Student*
▶ (840) *Understandings of Function Composition.*
Stacey A. Bowling, West Virginia University (1067-Z5-1727)

11:20AM *Mathematics Majors' Evaluation of*
(841) *Mathematical Arguments and Their Conception of Proof.*
Keith Weber, Rutgers University (1067-Z5-1339)

MAA-Young Mathematicians' Network Panel Discussion

9:00 AM – 10:20 AM   Mardi Gras D,
3rd Floor, Marriott

Career options for undergraduate mathematics majors.
Organizers: **Ralucca Gera**, Naval Postgraduate School
Tom Wakefield, Youngstown State University
Panelists: **Emily Kessler**, Society of Actuaries
Erin E. Corman, National Security Agency
Lee Seitelman, University of Connecticut
David Manderscheid, University of Nebraska-Lincoln
Fred Kluempen, Educational Testing Service

MAA Session for Chairs

9:00 AM – 10:20 AM   La Galerie 2,
2nd Floor, Marriott

The new MAA Curriculum Guide: What should it be?
Organizers: **Daniel Maki**, Indiana University
Catherine M. Murphy, Purdue University Calumet
Panelists: **Carol Schumacher**, Kenyon College
James Sellers, Pennsylvania State University

Student Hospitality Center

9:00 AM – 5:00 PM   Gallier Room,
4th Floor, Sheraton

AMS Session on Algebraic Geometry, I

9:15 AM – 11:55 AM   Napoleon D1,
3rd Floor, Sheraton

9:15AM *Visualizing Cubic Algebraic Surfaces.*
▶ (842) **Jennifer Elyse Bonsangue***, California State University of Channel Islands, and **Ivona Grzegorczyk**, California State University Channel Islands (1067-14-133)

9:30AM *Genus of rational space curves indicated*
(843) *by μ-bases.*
Xiaoran Shi*, Department of
Mathematics, University of Science and
Technology of China, Department of
Computer Science,Rice University,
Xiaohong Jia, Department of Computer
Science, the University of Hongkong, and
Ron Goldman, Department of Computer
Science, Rice University (1067-14-1259)

9:45AM *A new look at Verdier specialization.*
(844) **Paolo Aluffi**, Florida State University
(1067-14-1310)

10:00AM *Identities for $\wp$-functions.*
(845) **Christopher Athorne**, University of
Glasgow (1067-14-1453)

10:15AM *The Tate-Shafarevich Group, Flat*
(846) *Cohomology and Visibility.*
Saikat Biswas, Florida State University
(1067-14-1558)

10:30AM *Kottwitz's nearby-cycles conjecture for*
(847) *local models associated to unitary*
groups. Preliminary report.
Sean Rostami, University of Maryland
(1067-14-1641)

10:45AM *Algebraic density property of*
(848) *Danilov-Gizatullin surfaces.* Preliminary
report.
Fabrizio Donzelli, Stony Brook University
(1067-14-1764)

11:00AM *Motivic integral of K3 surfaces over*
(849) $\mathbb{C}((t))$.
Allen J Stewart* and **Vadim
Vologodsky**, University of Oregon
(1067-14-1786)

11:15AM *Some splice quotient double points.*
(850) **Elizabeth A. Sell**, Millersville University
(1067-14-1889)

11:30AM *Towards a salmon conjecture.*
(851) **Luke Oeding***, UniversitÃ degli studi di
Firenze, and **Daniel J. Bates**, Colorado
State University (1067-14-1922)

11:45AM *Positivity of Chern classes for Schubert*
(852) *varieties in low codimension.*
Judson P. Stryker, Florida State
University (1067-14-2190)

AMS Special Presentation

9:30 AM – 11:00 AM **Mardi Gras EFGH,
3rd Floor, Marriott**

*Who wants to be a
mathematician—National contest.*
Organizers: **Michael A. Breen**, AMS
William T. Butterworth,
DePaul University

Exhibits and Book Sales

9:30 AM – 5:30 PM **Grand Ballroom,
3rd Floor, Marriott**

MAA Committee on Graduate Students Poster Session

10:00 AM – NOON **Napoleon A1-A3,
3rd Floor, Sheraton**

*Professional science masters degrees in
the mathematical sciences.*
Organizer: **David Manderschied**,
University of
Nebraska-Lincoln

AWM Emmy Noether Lecture

10:05 AM – 10:55 AM **Great Ballroom
A-C, 5th Floor, Sheraton**

(853) *Orthogonal Representations: From
Groups to Hopf Algebras.*
M. Susan Montgomery, University of
Southern California (1067-16-4)

MAA Minicourse: #5: Part A

10:30 AM – 12:30 PM **Ile de France I,
3rd Floor, JW Marriott**

*A Game Theory path to quantitative
literacy.*
Organizers: **David L. Housman**, Goshen
College
Richard A. Gillman,
Valparaiso University

SIGMAA Officers Meeting

10:30 AM – NOON **La Galerie 6, 2nd Floor, Marriott**

Chair: **Amy Shell-Gellasch**, Beloit
College

MAA Panel Discussion

10:35 AM – 11:55 AM **Mardi Gras BC,
3rd Floor, Marriott**

*Writing the history of the MAA's first 100
years.*
Organizers: **Victor J. Katz**, University of
the District of Columbia
Janet Beery, University of
Redlands
Warren Page, New York City
College of Technology,
CUNY
Panelists: **Mary Gray**, American
University
David Zitarelli, Temple
University
Carol Mead, Archives of
American Mathematics

MAA Committee on Graduate Students/Young Mathematicians' Network Panel Discussion

10:35 AM – 11:55 AM Mardi Gras D, 3rd Floor, Marriott

Graduate school: Choosing one, getting in, staying in.
Organizers: **Aaron Luttman**, Clarkson University
Kristi Meyer, Wisconsin Lutheran College
Panelists: **Jessie Lenarz**, Concordia College
Richard McGehee, University of Minnesota
Jennifer McNulty, University of Montana

MAA Panel Discussion

10:35 AM – 11:55 AM La Galerie 2, 2nd Floor, Marriott

Proposal writing workshop for grant applications to the NSF Division of Undergraduate Education.
Organizers: **Dennis Davenport**, NSF DUE
Stephaine Fitchett, NSF DUE
Lee L. Zia, NSF DUE

AMS Panel Discussion

10:45 AM – NOON Nottoway Room, 4th Floor, Sheraton

Proving Hardy wrong: Math research with social justice applications.
Organizer: **Eva Curry**, Acadia University
Moderator: **Eva Curry**
Panelists: **Gizem Karaali**, Pomona College
Lili Khadjavi, Loyola Marymount University
Judith Sunley, National Science Foundation

SIAM Invited Address

11:10 AM – NOON Great Ballroom A-C, 5th Floor, Sheraton

(854) *In Pursuit of the Salesman: Mathematics at the Limits of Computation.* **William Cook**, Georgia Tech (1067-90-2415)

AMS Colloquium Lectures: Lecture II

1:00 PM – 2:00 PM Great Ballroom A-C, 5th Floor, Sheraton

▶ (855) *Expander graphs in pure and applied mathematics, II.* Preliminary report. **Alexander Lubotzky**, The Hebrew University of Jerusalem (1067-11-14)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, IV

1:00 PM – 3:50 PM Orleans, 3rd Floor, JW Marriott

Organizers: **Darren A. Narayan**, Rochester Institute of Technology
Bernard Brooks, Rochester Institute of Technology
Jobby Jacob, Rochester Institute of Technology
Jacqueline A. Jensen, Sam Houston State University
Carl V. Lutzer, Rochester Institute of Technology

1:00PM ▶ (856) *Graphs with large second neighborhood.* Preliminary report. **Brooks E Smith***, Notredame, **Chang Mou Lim**, Yale, and **Antonio Blanca**, Georgia Institute of Technology (1067-05-1526)

1:30PM (857) *A Poisson Approximation for the Number of kl-Matches I.* **Katherine A Grzesik***, SUNY Oswego, **Heather Shappell**, Arcadia University, **Michael Donders**, McDaniel College, and **Chelsea Ross**, ETSU (1067-62-1748)

2:00PM (858) *SET® and disjoint complete caps in $AG(4, 3)$.* **Michael Follett**, Lafayette College, **Catherine Pelland**, Pomona College, **Robert Won**, Duke University, and **Elizabeth McMahon***, Lafayette College (1067-51-1761)

2:30PM ▶ (859) *Working with Cubic Splines and Neural Data.* Preliminary report. **Jeffrey Liebner***, Lafayette College, **Julie Michelman**, Carleton College, **Micah Pearce**, Texas Tech University, and **Jiaqi Li**, Lafayette College (1067-62-1305)

3:00PM ▶ (860) *Applications of discrete wavelets.* **P. Laverty***, **S. Alzouma** and **W. Lambdin**, University of Richmond (1067-94-1345)

3:30PM (861) *Recovering a group from its asynchronous automatic structure.* **Maria Monks**, University of California, Berkeley

AMS-MAA-MER Special Session on Mathematics and Education Reform, II

1:00 PM – 3:50 PM   Napoleon C1, 3rd Floor, Sheraton

Organizers: **William H. Barker**, Bowdoin College
William G. McCallum, University of Arizona
Bonnie S. Saunders, University of Illinois at Chicago

1:00PM   *Mathematical Literacy and Quantitative*
▶ (862)   *Literacy: Symbiosis or Competition?*
Deborah Hughes Hallett, University of Arizona/Harvard Kennedy School (1067-97-1214)

1:30PM   *Reorganizing School Mathematics for*
▶ (863)   *Quantitative Literacy.*
Rick Gillman, Valparaiso University (1067-97-550)

2:00PM   *Quantitative Literacy and the "Big Ideas"*
▶ (864)   *of High School Mathematics.*
Brian Beaudrie*, Winona State University, **Emily Ricard**, New Hampshire Impact Center, **Greg Superchi**, Lisbon High School, and **David Gilcreast**, Pelham High School (1067-97-1221)

2:30PM   *Quantitative Literacy and College*
▶ (865)   *Readiness.*
Cathy L Seeley, Charles A. Dana Center, University of Texas (1067-97-2385)

3:00PM   *The Role of QL in the High School*
▶ (866)   *Mathematics Curriculum: What Students Need to Know to Be College Ready.*
Corrine H Taylor, QR Program, Wellesley College (1067-97-2139)

3:30PM   *The Role of QL in the High School*
▶ (867)   *Mathematics Curriculum Panel Discussion.*
Eric C Gaze, Bowdoin College (1067-97-1307)

AMS-MAA Special Session on History of Mathematics, IV

1:00 PM – 3:50 PM   Maurepas, 3rd Floor, JW Marriott

Organizers: **Sloan E. Despeaux**, Western Carolina University
Craig G. Fraser, University of Toronto
Deborah Kent, Hillsdale College

1:00PM   *Mary Cartwright and G.H. Hardy's 1928*
▶ (868)   *Oxford Seminar.*
James J. Tattersall*, Providence College, and **Shawnee L. McMurran**, California State University San Bernardino (1067-01-613)

1:30PM   *George Whaples: A Novice in Emil Artin's*
▶ (869)   *Mathematical Circle.*
Della D. Fenster*, University of Richmond, and **Joachim Schwermer**, University of Vienna (1067-01-1547)

2:00PM   *Advertising and Patronage in Laplace's*
▶ (870)   *Early Writing.* Preliminary report.
Menolly Lysne, IHPST at University of Toronto (1067-01-1012)

2:30PM   *Circulating Mathematics and Connecting*
(871)   *Mathematicians:* The American Journal of Mathematics, 1878-1930.
Deborah Kent, Hillsdale College (1067-01-2354)

3:00PM   *Roles of an International Journal: Acta*
▶ (872)   *Mathematica and Italian Mathematicians, 1882–1927.* Preliminary report.
Laura E. Turner, Aarhus Universitet (1067-01-2104)

3:30PM   *On the universalization of matrix*
▶ (873)   *decomposition: algebraic practices and their circulations (1830-1930).*
Frédéric Brechenmacher, CNRS - Institut de Mathématiques de Jussieu, Paris &Laboratoire de Mathématiques Lens. Univ. Lille (1067-01-1433)

AMS-SIAM Special Session on Mathematics of Computation: Algebra and Number Theory, II

1:00 PM – 3:50 PM   Napoleon D2, 3rd Floor, Sheraton

Organizers: **Gregor Kemper**, Technische Universität München
Michael J. Mossinghoff, Davidson College
Igor E. Shparlinski, Macquarie University

1:00PM   *Lehmer's conjecture and points on*
(874)   *elliptic curves that are congruent to torsion points.* Preliminary report.
Joseph H. Silverman, Brown University (1067-11-113)

1:30PM   *Minimal polynomials of algebraic*
(875)   *numbers with rational parameters.*
Karl Dilcher, **Rob Noble**, Dalhousie University, and **Chris Smyth***, University of Edinburgh, UK (1067-11-495)

2:00PM   *Pisot and Salem polynomials dividing*
(876)   *Newman polynomials.*
Kevin G. Hare*, University of Waterloo, and **Michael Mossinghoff**, Davidson College (1067-11-348)

2:30PM   *Effective solution of Norm-form*
(877)   *equations.* Preliminary report.
Michael A. Bennett, University of British Columbia (1067-11-2080)

3:00PM   *The Smoothed Pólya-Vinogradov*
▶ (878)   *Inequality and some Applications.*
Preliminary report.
Enrique Trevino, Dartmouth College (1067-11-608)

3:30PM *On the density of abundant numbers.*
► (879) Preliminary report.
Mitsuo Kobayashi, California State
Polytechnic University, Pomona
(1067-11-214)

AMS-ASL Special Session on Logic and Analysis, II

1:00 PM – 3:50 PM   Napoleon C2,
                                3rd Floor, Sheraton

Organizers: **Jeremy Avigad**, Carnegie
Mellon University
Ulrich W. Kohlenbach,
Technische Universität
Darmstadt
Henry Towsner, University
of California Los Angeles

1:00PM *Uniform Bounds from Proofs in Nonlinear*
(880) *Ergodic and Fixed Point Theory.*
Ulrich Kohlenbach, TU Darmstadt
(1067-03-391)

1:30PM *Proof mining in nonstandard analysis.*
(881) Preliminary report.
Eyvind Martol Briseid, TU Darmstadt
(1067-03-727)

2:00PM *Computability and Complexity in*
(882) *Geometric Measure Theory.*
Jack H Lutz, Iowa State University
(1067-03-864)

2:30PM *Ramsey's theorem for pairs and program*
(883) *extraction.*
Alexander P. Kreuzer, Technische
Universität Darmstadt (1067-03-547)

3:00PM *Applications of Logic to Analysis.*
(884) **Vassilios Gregoriades**, TU Darmstadt
(1067-03-737)

3:30PM *Reverse mathematics and constructive*
(885) *analysis.*
Jeffry L. Hirst*, Appalachian State
University, and **Carl Mummert**, Marshall
University (1067-03-1581)

AMS Special Session on Birational Geometry and Moduli Spaces (Mathematics Research Communities session), II

1:00 PM – 3:50 PM   Napoleon B1,
                                3rd Floor, Sheraton

Organizers: **Kevin Tucker**, University of
Utah
Dawei Chen, University of
Illinois at Chicago
Amanda Knecht, University
of Michigan
David Swinarski, University
of Georgia

1:00PM *Conformal Blocks Divisors on $\overline{M}_{0,n}$.*
(886) **Angela Gibney***, **Valery Alexeev** and
David Swinarski, University of Georgia
(1067-14-656)

1:30PM *Cox rings and pseudoeffective cones of*
(887) *projectivized toric vector bundles.*
Jose Luis Gonzalez, University of
Michigan (1067-14-174)

2:00PM *Beyond the Boundary: Log Minimal*
(888) *Models for the Moduli Space of Curves.*
David Jensen, SUNY Stony Brook
(1067-14-381)

2:30PM *Spaces of rational curves on*
(889) *hypersurfaces.*
Roya Beheshti* and **Mohan Kumar**,
Washington University in St. Louis
(1067-14-1189)

3:00PM *The effective cone of the space of*
(890) *parametrized rational curves in*
Grassmannians. Preliminary report.
Shin-Yao Jow, University of Pennsylvania
(1067-14-458)

3:30PM *The birational geometry of the Hilbert*
(891) *Scheme of points in the plane.*
Izzet Coskun*, University of Illinois at
Chicago, **Aaron Bertram**, University of
Utah, and **Daniele Arcara**, St Vincent
College (1067-14-873)

AMS Special Session on Lie Algebras, Algebraic Groups, and Related Topics, I

1:00 PM – 3:50 PM   Conde, 3rd Floor, JW Marriott

Organizers: **Audrey L. Malagon**, Mercer
University
Julie C. Beier, Mercer
University
Daniel K. Nakano,
University of Georgia

1:00PM *Levi factors of linear algebraic groups.*
(892) **George J. McNinch**, Tufts University
(1067-20-1886)

1:30PM *On maximal weights of integrable*
(893) $\widehat{sl}(n,\mathbb{C})$*-modules.* Preliminary report.
Rebecca L. Jayne, North Carolina State
University (1067-17-899)

2:00PM *N-point Virasoro algebras and their*
(894) *dense representations.*
Ben L Cox*, College of Charleston,
Xiangqian Guo, Zhengzhou University,
Rencai Lu, Suzhou University, and
Kaiming Zhao, Wilfrid Laurier University
(1067-17-1228)

2:30PM *Degeneracy and Decomposability in*
(895) *Abelian Crossed Products.*
Kelly McKinnie, University of Montana
(1067-16-1856)

3:00PM *Cohomology rings for quantized*
(896) *enveloping algebras.* Preliminary report.
Christopher Martin Drupieski,
University of Georgia (1067-17-1186)

3:30PM *W-constraints for simple singularities.*
(897) **Bojko Bakalov***, North Carolina State
University, and **Todor Milanov**, IPMU,
Japan (1067-17-1801)

AMS Special Session on Wavelets, Tilings, and Iterated Function Systems, II

1:00 PM – 3:50 PM   **Napoleon C3, 3rd Floor, Sheraton**

Organizers: **Palle E. Jorgensen**, University of Iowa
David R. Larson, Texas A&M University
Gestur Olafsson, Louisiana State University

1:00PM *Crossed products in Gabor analysis and*
(898) *Rieffel projections in rotation algebras.* Preliminary report.
Franz Luef, UC Berkeley (1067-47-621)

1:30PM *Matrix Factorization and Lifting.*
(899) **Palle E. T. Jorgensen**, The University of Iowa, and **Myung-Sin Song***, Southern Illinois University Edwardsville (1067-42-1298)

2:00PM *Filtering Directional Bias and the*
(900) *Construction of Artifact-free Synthetic Tubular Structures in 3D.* Preliminary report.
Manos Papadakis, University of Houston (1067-42-1410)

2:30PM *p-Adic Wavelets: Quincunx MRA and*
(901) *Biorthogonal Systems.*
Emily J. King*, National Institutes of Health / Norbert Wiener Center UMD, and **Maria A. Skopina**, St. Petersburg State University, Russia (1067-43-1253)

3:00PM *Sparsity of the fusion frame operator*
(902) *and nonorthogonal fusion frames.*
Jameson Cahill, **Pete Casazza**, University of Missouri, and **Shidong Li***, San Francisco State University (1067-41-1613)

3:30PM *Simple wavelet sets for multiwavelets in*
(903) $\mathbb{R}^2$ *and* $\mathbb{R}^3$. Preliminary report.
Kathy D. Merrill, Colorado College (1067-42-1517)

AMS Special Session on Stochastic Analysis and Random Phenomena, II

1:00 PM – 3:50 PM   **Maurepas Room, 3rd Floor, Sheraton**

Organizers: **Ambar N. Sengupta**, Louisiana State University
P. Sundar, Louisiana State University

1:00PM *Emissions Option Pricing and Singular*
▶ (904) *BSDEs.* Preliminary report.
Rene Carmona, Princeton University (1067-60-2409)

1:30PM *Drawdowns and drawups.*
(905) **Olympia Hadjiliadis**, City University of New York (1067-60-1707)

2:00PM *Sensitivity Analysis of Expected Values.*
(906) **Victor Goodman**, Indiana University (1067-60-1963)

2:30PM *Option Pricing With Transaction Costs*
(907) *And Stochastic Volatility.*
Maria C. Mariani*, The University of Texas at El Paso, **Emmanuel Ncheuguim**, NMSU, **Ionut Florescu**, Stevens Institute of Technology, and **Indranil Sen Gupta**, The University of Texas at El Paso (1067-91-1304)

3:00PM *Cooperative dynamics of kinesin and*
(908) *dynein type molecular motors.*
Avanti Athreya, Duke University, **John Fricks**, Penn State University, **Peter R Kramer**, Rensselaer Polytechnic Institute, and **Scott A McKinley***, University of Florida (1067-60-2138)

3:30PM *Statistical Modeling of Methylation*
▶ (909) *Patterns in Ovarian Carcinomas.*
Michelle R Lacey, Tulane University (1067-60-1618)

AMS Special Session on Model Theory of Fields and Applications (Mathematics Research Communities session), II

1:00 PM – 3:50 PM   **Napoleon B2, 3rd Floor, Sheraton**

Organizers: **Benjamin A. Hutz**, CUNY Graduate Center
Jana Marikova, Western Illinois University
Jerome Poineau, University of Strasbourg
Yimu Yin, University of Pittsburgh

1:00PM *Model theory of multiplicative valued*
▶ (910) *difference fields.*
Koushik Pal, University of California Berkeley (1067-03-1880)

1:30PM *Solutions of linear equations in a model*
(911) *complete theory of valued D-fields.*
Meghan B Anderson, University of California, Berkeley (1067-03-1867)

2:00PM *Model theory of fields with operators and*
(912) *dynamics.*
Thomas Warren Scanlon, University of California, Berkeley (1067-03-2055)

3:00PM *Further applications of ACFA to*
(913) *polynomial dynamics.* Preliminary report.
Alice Medvedev* and **Thomas Scanlon**, University of California, Berkeley (1067-12-2371)

3:30PM *Rings Arising in a Stable Context.*
(914) **Paul Baginski**, Universite Lyon 1 (1067-03-1487)

AMS Special Session on Commutative Algebra (Mathematics Research Communities session), II

1:00 PM – 3:50 PM   **Napoleon B3, 3rd Floor, Sheraton**

Organizers: **Christine Berkesch**, Stockholm University

Bhargav Bhatt, University of Michigan, Ann Arbor

Jason McCullough, University of California, Riverside

Javid Validashti, University of Kansas

1:00PM (915) *Finite free resolutions of varieties with symmetries.* Preliminary report. **Witold Kraskiewicz**, N. Copernicus University, Torun, Poland, and **Jerzy Weyman***, Northeastern University (1067-13-1777)

1:30PM ▶ (916) *Bounds on the degrees of generators of Bruns ideals.* Preliminary report. **Douglas A Torrance**, University of Idaho (1067-13-407)

2:00PM ▶ (917) *Bounds for arithmetic rank.* **Manoj Kummini*** and **Uli Walther**, Purdue University (1067-13-1210)

2:30PM (918) *Cartier Modules on Toric Varieties.* **Jen-Chieh Hsiao**, Purdue University, **Karl Schwede**, Pennsylvania State University, and **Wenliang Zhang***, University of Michigan (1067-13-395)

3:00PM (919) *F-pure thresholds of hypersurfaces over fields of positive characteristic.* **Daniel Jesús Hernández**, University of Michigan, Ann Arbor (1067-13-392)

3:30PM (920) *On parameter F-jumping numbers.* **Craig Huneke**, University of Kansas, **Shunsuke Takagi***, Kyushu University/Massachusetts Institute of Technology, and **Kei-ichi Watanabe**, Nihon University (1067-13-1341)

AMS Special Session on Knots, Links, 3-Manifolds, and Physics, I

1:00 PM – 3:50 PM   Borgne Room, 3rd Floor, Sheraton

Organizers: **Robert Kusner**, University of Massachusetts, Amherst

Rafal Komendarczyk, Tulane University

1:00PM (921) *Virtual Knots, Khovanov Homology and Quantum Information.* **Louis H. Kauffman**, University of Illinois at Chicago (1067-57-1589)

2:00PM (922) *Categorification in knot and graph theory.* **Radmila Sazdanovic**, University of Pennsylvania (1067-57-1825)

2:30PM (923) *Commensurability classes of hyperbolic knot complements and hidden symmetries.* **Neil R Hoffman**, University of Texas at Austin (1067-57-296)

3:00PM (924) *Two-fold branched covers.* **Dave Auckly**, Mathematical Sciences Research Institute (1067-57-924)

3:30PM (925) *Tightness in contact metric manifolds.* **John Etnyre***, Georgia Institute of Technology, **Rafal Komendarczyk**, Tulane University, and **Patrick Massot**, Universite Paris Sud, Orsay (1067-57-1146)

AMS Special Session on Structured Models in Ecology, Evolution, and Epidemiology: Periodicity, Extinction, and Chaos, II

1:00 PM – 3:50 PM   Napoleon D3, 3rd Floor, Sheraton

Organizers: **Sophia R.-J. Jang**, Texas Tech University

Linda J. S. Allen, Texas Tech University

Lih-Ing W. Roeger, Texas Tech University

1:00PM (926) *Attenuance and Resonance of Periodic Cycles in Periodically Forced Population Models.* Preliminary report. **Vlajko L Kocic**, Xavier University of Louisiana (1067-39-486)

1:30PM (927) *Evolution and competitive coexistence in food chains.* **Rosalyn C. Rael***, University of Michigan, and **J. M. Cushing**, University of Arizona (1067-92-2350)

2:00PM (928) *An Exactly Solveable SIR Model Having Population Dynamics.* **Ronald Mickens**, Clark Atlanta University (1067-35-1962)

2:30PM ▶ (929) *On a Fractional Order Epidemic Model.* **Elif Demirci*** and **Nuri Ozalp**, Ankara University (1067-37-1121)

3:00PM (930) *Interactions among virulence, coinfection and drug resistance in a complex life-cycle parasite.* **Dashun Xu***, Southern Illinois University Carbondale, **Gregory J Sandland**, Department of Biology, University of Wisconsin, **Dennis J Minchella**, Department of Biological Sciences, Purdue University (West Lafayette), and **Zhilan Feng**, Purdue University (West Lafayette) (1067-45-1953)

3:30PM (931) *Competitive exclusion and coexistence in a Leslie-Gower competition model with Allee effects.* Preliminary report. **Sophia R.-J. Jang**, Texas Tech University (1067-92-2111)

AMS Special Session on Interactions of Inverse Problems, Signal Processing, and Imaging, II

1:00 PM – 3:50 PM   Frontenac, 3rd Floor, JW Marriott

Organizer: **Zuhair Nashed**, University of Central Florida

1:00PM *Sparse Regularization of Geophysical*
(932) *Inverse Problems by a Greedy Algorithm.*
Volker Michel, Geomathematics Group,
University of Siegen (1067-65-1199)

1:30PM *On the multi-parameter regularization*
(933) *for ill-posed problems.*
Sergei Pereverzyev*, **Sivananthan
Sampath** and **Valeriya Naumova**, Johann
Radon Institute for Computational and
Applied Mathematics (1067-65-226)

2:00PM *Four kinds of expressing solution*
(934) *smoothness and their consequences for
ill-posed problems.*
Bernd Hofmann, Chemnitz University of
Technology (1067-65-517)

2:30PM *On the problem of parameter estimation*
(935) *in exponential sums.*
Frank Filbir, Institute of Biomathematics
and Biometry, Helmholtz Center Munich,
Germany, **Hrushikesh N. Mhaskar**,
California State University, Los Angeles,
and **Jürgen Prestin***, University of
Lübeck, Germany (1067-42-1200)

3:00PM *Non-linear signal representations,*
(936) *subspace clustering and some
applications.*
Akram Aldroubi, Vanderbilt University
(1067-68-584)

3:30PM *Sampling theorems associated with*
(937) *Singular Basic Sturm Liouville Problems.*
Mahmoud H. Annaby*, Qatar University,
Hassan A. Hassan, Faculty of Basic
Education, Kuwait, and **Zeinab S.
Mansour**, King Saud University
(1067-39-1154)

MAA Invited Paper Session on Topics in Hopf Algebras

1:00 PM – 3:50 PM   **Rhythms II and
III, 2nd Floor, Sheraton**

Organizers: **Serban Raianu**, California
State University, Dominguez
Hills
Davida Fischman,
California State University,
San Bernardino

1:00PM *Hopf algebras- a unifying theory.*
(938) Preliminary report.
Miriam Cohen*, Ben Gurion University,
and **Sara Westreich**, Bar Ilan University
(1067-AD-509)

1:30PM *Knots and Algebra Intertwined.*
▶ (939) **David E Radford**, U. of Illinois at Chicago
(1067-AD-1185)

2:00PM *Frobenius-Schur indicators: from groups*
▶ (940) *to Hopf algebras.*
Andrea Jedwab, University of Southern
California (1067-AD-1066)

2:30PM *Hopf Algebras from Graphs.* Preliminary
(941) report.
Miodrag Cristian Iovanov, University of
Southern California; U Bucharest
(1067-AD-1696)

3:00PM *Corings and descent theory.*
(942) **Stefaan Caenepeel**, Vrije Universiteit
Brussel (1067-AD-1314)

3:30PM *On the classification of fusion categories*
▶ (943) *in small dimensions.*
David A Jordan*, Massachusetts
Institute of Technology, and **Eric Larson**,
Harvard University (1067-AD-405)

MAA Minicourse #10: Part A

1:00 PM – 3:00 PM   **Ile de France I,
3rd Floor, JW Marriott**

*Teaching introductory statistics (for
instructors new to teaching intro stats).*
Organizers: **Michael A. Posner**,
Villanova University
Carolyn K. Cuff,
Westminster College

MAA Minicourse #13: Part A

1:00 PM – 3:00 PM   **Ile de France III,
3rd Floor, JW Marriott**

*Creating demonstrations and guided
explorations for multivariable calculus
using CalcPlot3D.*
Organizer: **Paul Seelburger**, Monroe
Community College

MAA Minicourse #1: Part A

1:00 PM – 3:00 PM   **Ile de France II,
3rd Floor, JW Marriott**

*Special relativity through a linear
algebraic lens.*
Organizer: **John de Pillis**, Unversity of
California Riverside

AMS Session on Algebraic Geometry, II

1:00 PM – 3:25 PM   **Napoleon D1,
3rd Floor, Sheraton**

1:00PM *On Weierstrass semigroups of m-tuples*
(944) *of places on function fields associated
with linearized polynomials.*
Gretchen L. Matthews and **Justin
D. Peachey***, Clemson University
(1067-14-1656)

1:15PM *Some new results on invariants of*
(945) *F-crystals.*
Xiao Xiao, Binghamton University
(1067-14-42)

1:30PM *Toric Symmetry in Gromov-Witten Theory*
▶ (946) *and Enumerative Geometry: Blowups of
Complex Projective Space.*
Dagan Karp, **Dhruv Ranganathan*** and
Paul L Riggins, Harvey Mudd College
(1067-14-169)

1:45PM *Picard-Fuchs Equations for a Family of K3*
(947) *Hypersurfaces.*
Daniel Moore* and **Dmitri Skjorshammer**, Harvey Mudd College (1067-14-177)

2:00PM *Classification of Tops in Five Dimensions.*
▶ (948) **Dmitri Skjorshammer**, Harvey Mudd College (1067-14-178)

2:15PM *Vector bundles of conformal blocks.*
(949) Preliminary report.
David J Swinarski, University of Georgia (1067-14-634)

2:30PM *Counting Generating Invariants for the*
▶ (950) *Action of a Semisimple Group.*
Harlan Kadish, University of Michigan (1067-14-848)

2:45PM *Exact Sums-of-Squares Certificates in*
(951) *Numeric Algebraic Geometry.*
Sharon Elizabeth Hutton*, **Erich L. Kaltofen**, North Carolina State University, and **Lihong Zhi**, KLMM, Academy of Math and System Sciences (1067-14-2189)

3:00PM *On the Number of Erdös' Consistent*
(952) *5-tuples.*
Hongbo Li, Chinese Academy of Sciences (1067-14-658)

3:15PM *Polynomials Nonnegative on Half-strips*
(953) *and Multiple Strips.*
Ha N Nguyen, Wesleyan College (1067-14-293)

AMS Session on Numerical Analysis, II

1:00 PM – 3:55 PM   **La Galerie 1, 2nd Floor, Marriott**

1:00PM *Commuting Smoothed Projectors in*
(954) *Weighted Spaces.*
Minah Oh*, James Madison University, and **Jay Gopalakrishnan**, University of Florida (1067-65-1099)

1:15PM L_q *error estimates and superconvergence*
(955) *analysis for finite element methods for compressible miscible displacement.*
Kening Wang*, University of North Florida, and **Shuang Li**, Ernst & Young LLP (1067-65-2357)

1:30PM *Oscillation-Free Operator Splitting*
▶ (956) *Method for Semilinear Diffusion Equations.*
R. Corban Harwood*, **Likun K. Zhang**, **T. Zaki Jubery**, Washington State University, **Greg M. Vogel**, Utah State University, **W. Gitau Munge**, **Joe J. Theisen** and **V. S. Manoranjan**, Washington State University (1067-65-612)

1:45PM *Spectral Collocation/p-Version Finite*
(957) *Element Methods for Hamiltonian Dynamical Systems.*
Zhimin Zhang* and **Nairat Kanyamee**, Wayne State University (1067-65-457)

2:00PM *Domain Decomposition Solvers for*
(958) *Nonlinear Multiharmonic Finite Element Equations.*
Dylan M Copeland*, Texas A&M University, and **Ulrich Langer**, Johannes Kepler University (1067-65-252)

2:15PM *A two domain discontinuous solution to*
(959) *chemical transport in a small artery and arterial wall.*
Shelly M McGee*, University of Findlay, and **Padmanabhan Seshaiyer**, George Mason University (1067-65-2212)

2:30PM *Numerical solution for parabolic*
(960) *equations by a hybrid method.*
Samuel N. Jator, Austin Peay State University (1067-65-1081)

2:45PM *A discontinuous Galerkin method for*
(961) *solving a modified Leakeas-Larsen equation.*
Weimin Han, **Joseph A Eichholz***, University of Iowa, **Xiaoliang Cheng**, Zhejiang University, and **Ge Wang**, Virginia Tech-Wake Forest University (1067-65-2145)

3:00PM *An Evaluation of Solution Algorithms and*
(962) *Numerical Approximation Methods for Modeling an Ion Exchange Process.*
Sunyoung Bu*, **Jingfang Huang**, University of North Carolina at chapel hill, **Treavor H Boyer**, University of Florida, and **Cass T Miller**, University of North Carolina at chapel hill (1067-65-1809)

3:15PM *The Alignment of Manifold Sections for*
(963) *Manifold Learning.* Preliminary report.
Weifeng Zhi, University of Kentucky (1067-65-1599)

3:30PM *On the convergence of iterative*
(964) *refinement/improvement of the solution to an ill conditioned linear system.*
Abdramane Serme* and **Jean W. Richard**, BMCC/CUNY-The City University of New York (1067-65-2366)

3:45PM *Numerical solution for nonlinear*
(965) *differential equations via combined block-pulse and orthogonal functions.*
Mohsen Razzaghi, Mississippi State University (1067-49-564)

AMS Session on Partial Differential Equations, II

1:00 PM – 3:55 PM   **Balcony N, 4th Floor, Marriott**

1:00PM *On the Multi-dimensional*
(966) *Controller-and-stopper Games.*
Yu-Jui Huang* and **Erhan Bayraktar**, University of Michigan, Ann Arbor (1067-35-463)

1:15PM *A new boundary closure scheme for the*
(967) *multiresolution time-domain(MRTD) calculations.*
Pengfei Yao* and **Shan Zhao**, University of Alabama (1067-35-254)

1:30PM ► (968) *Galerkin boundary integral analysis of the Grad-Shafranov equation.* **U Pablo Suarez**, Delaware State University (1067-35-1931)

1:45PM (969) *A direct method for solving an ill-posed inhomogeneous elliptic problem.* **Haiyan Tian***, The University of Southern Mississippi, and **Andreas Grunewald**, Bonn Graduate School of Economics (1067-35-2384)

2:00PM ► (970) *A Round Peg in a Square Hole? Application of Non-uniform Rectangular Grid Schemes to Circular Domains.* **Vincent J van Joolen**, United States Naval Academy (1067-35-2048)

2:15PM (971) *New Numerical Results on the Surface Quasi-Geosgrophic Equations.* Preliminary report. **Ramjee P Sharma*** and **Jiahong Wu**, Oklahoma State University (1067-35-366)

2:30PM (972) *Finite Difference Methods for Solving the Coupled Non-Linear Euler-Bernoulli Beam Equations, with applications to modeling the wing of a Micro Air Vehicle.* **James Francis Hickman**, Shippensburg University (1067-35-2204)

2:45PM (973) *Dual Interpolants for Finite Element Methods.* **Andrew K. Gillette*** and **Chandrajit Bajaj**, University of Texas at Austin (1067-35-173)

3:00PM (974) *An Explicit Super-Time-Stepping Scheme for Non-Symmetric Parabolic Differential Equations.* **Katharine F. Gurski***, Howard University, and **Stephen O'Sullivan**, Dublin City University (1067-35-165)

3:15PM (975) *Spectrum of Constrained Gradient Flows of Functionalized Energies.* Preliminary report. **Gurgen Hayrapetyan*** and **Keith Promislow**, Michigan State University (1067-35-2360)

3:30PM (976) *Local Solvability on* $\mathbb{H}_1$: *Non-homogeneous operators.* Preliminary report. **Christopher J. Winfield**, Madison Area Science and Technology (1067-35-601)

3:45PM (977) *Solutions of Fractional Order Partial Differential Equations.* **Lokenath Debnath**, University of Texas-Pan American (1067-35-1046)

AMS Session on Mathematical Biology and Ecology, II

1:00 PM – 3:25 PM   Bayside B, 4th Floor, Sheraton

1:00PM (978) *Optimized Scoring Function to Predict Solubility Mutagenesis.* **Ye (Alice) Tian***, Washington State University, **Christopher Deutsch**, Portland State University, and **Bala Krishnamoorthy**, Washington State University (1067-92-471)

1:15PM (979) *An Heterogenous Adaptive Sparse Grid Method For Representing High Dimensional Free Energy Landscape in Proteins.* **Chuanbin Du***, **Hui Wang**, **Dennis Livesay** and **Donald Jacobs**, University of North Carolina at Charlotte (1067-92-2377)

1:30PM (980) *The degree of phase locking observed in hybrid neural circuits can be explained using maps based on the phase resetting curve.* **Srisairam Achuthan***, Neuroscience Center of Excellence, LSU Health Sciences Center, **Jianxia Cui**, BioCircuits Institute, University of California, San Diego, **Robert J. Butera**, Laboratory for Neuroengineering, School of Electrical and Computer Engineering, Georgia Institute of Technology, and **Carmen C. Canavier**, Neuroscience Center of Excellence, LSU Health Sciences Center (1067-92-2335)

1:45PM (981) *Stability of two cluster solutions in pulse coupled networks of neural oscillators.* **Lakshmi Chandrasekaran**, Louisiana State University Health Sciences Center (1067-92-275)

2:00PM ► (982) *Chord groups associated with DNA recombination in Ciliates.* Preliminary report. **Muche A Tilahun**, University of South Florida (1067-92-1148)

2:15PM (983) *Dynamics Of The Drosophila Circadian Clock: Theoretical Anti-Jitter Network And Controlled Chaos.* **Hassan M Fathallah-Shaykh**, The University of Alabama at Birmingham (1067-92-1236)

2:30PM ► (984) *Boundaries of Sustainability in Simple and Elaborate Models of Agricultural Pest Control with a Pesticide and a Nontoxic Refuge.* Preliminary report. **Jemal S Mohammed-Awel***, Valdosta State University, **John Bantle**, **Aaron Festinger**, **Ryan Klafehn**, **Hee-Joon Jo** and **John Ringland**, University at Buffalo (1067-92-307)

2:45PM (985) *Optimal Control of a Cholera Model by Vaccination.* **Peng Zhong***, **Suzanne Lenhart**, University of Tennessee, and **Elsa Schaefer**, Marymount University (1067-92-1975)

3:00PM (986) *How do we measure the response of species interactions to climate change? The use of models and experiments to study myrmecochory.* **Judith E Canner**, California State University, Monterey Bay (1067-92-1540)

3:15PM (987) *A mathematical model to highlight the importance of vector demography in malaria dynamics and control.* **Miranda Ijang Teboh-Ewungkem***, Lafayette College, **Gideon Akumah Ngwa**, University of Buea, Cameroon, and **Calistus Ngonghala**, West Virginia University (1067-92-735)

AMS Session on Combinatorics and Graph Theory, VI

1:00 PM – 3:55 PM Southdown Room, 4th Floor, Sheraton

1:00PM (988) *Edges in 2-factor Isomorphic Graphs.* **Paul Wrayno*** and **Ronald J. Gould**, Emory University (1067-05-903)

1:15PM ► (989) *How large is your diameter? A quest for the diameter of a Rational Residue Graph.* **Mark Budden**, Western Carolina University, **Nicole Calkins**, **William Nathan Hack***, **Joshua K Lambert** and **Kimberly Thompson**, Armstrong Atlantic State University (1067-05-1272)

1:30PM (990) *Extremal coin graphs on multiple radii.* Preliminary report. **Jill Bigley Dunham**, Hood College (1067-05-253)

1:45PM ► (991) *φ-Symmetric Hamilton Cycle Decompositions of Graphs.* Preliminary report. **Michael William Schroeder**, University of Wisconsin - Madison (1067-05-2029)

2:00PM (992) *Distance Labelings of Trees.* Preliminary report. **Joshua Hanes***, Mississippi University for Women, and **Tristan Denley**, Austin Peay State University (1067-05-1853)

2:15PM ► (993) *A new class of hyper-energetic graphs.* Preliminary report. **Nafiseh Jahanbakht**, University of Lethbridge (1067-05-1800)

2:30PM (994) *Top to random shuffles and number of fixed points.* Preliminary report. **Lerna Pehlivan**, Carleton University (1067-05-220)

2:45PM (995) *Permutation Puzzles.* **Evan M. O'Dorney**, Danville, California (1067-05-1175)

3:00PM ► (996) *Exhaustive Random Permutations.* Preliminary report. **Palmer C Mebane**, Harvey Mudd College (1067-05-1751)

3:15PM (997) *Coin set extensions in the greedy change-making problem.* **Tianhui Cai**, Harvard College (1067-05-1667)

3:30PM (998) *Group Divisible Designs with Fixed Block Configuration.* Preliminary report. **Melanie Laffin*** and **Melissa Keranen**, Michigan Technological University (1067-05-1360)

3:45PM (999) *Weak Transversals of Latin Squares.* **J Kyle Pula***, University of Denver, and **Ian Wanless**, Monash University (1067-05-1503)

MAA Session on Effective Teaching of Upper Level Mathematics to Secondary Education Mathematics Majors, I

1:00 PM – 3:15 PM Grand Couteau Room, 5th Floor, Sheraton

Organizer: **Joyati Debnath**, Winona State University

1:00PM ► (1000) *The Impact of the Moore Method on Secondary Mathematics Education Majors.* Preliminary report. **Joy Moore**, Xavier University (1067-E1-2410)

1:20PM (1001) *Changing Their Culture: A Multi-Faceted Approach to Improving Math Secondary Education Major's View of Mathematics.* **Scott S Searcy*** and **Jeffrey B Biessman**, Waldorf College (1067-E1-944)

1:40PM ► (1002) *Pre-Algebra Connections with the Chinese Remainder Theorem.* **Elizabeth A Burroughs**, Montana State University (1067-E1-2179)

2:00PM (1003) *Minding the Pre-service Teacher Students in a Discrete Mathematics Class.* Preliminary report. **Feryal Alayont**, Grand Valley State University (1067-E1-1830)

2:20PM ► (1004) *The Calculus Book: A Text for Analysis?* Preliminary report. **Ockle E Johnson**, Keene State College (1067-E1-1244)

2:40PM ► (1005) *"Practicing What We Preach" in Multivariable Calculus.* Preliminary report. **Sharon S. Emerson-Stonnell**, Longwood University (1067-E1-1482)

3:00PM ► (1006) *Making Connections in Real Analysis for Students Interested in Secondary Mathematics Education.* **Sandra Fillebrown**, Saint Joseph's University (1067-E1-830)

MAA Session on The Mathematics of Games and Puzzles, II

1:00 PM – 3:55 PM Grand Chenier Room, 5th Floor, Sheraton

Organizers: **Laura Taalman**, James Madison University

Robin L. Blankenship, Morehead State University

1:00PM ► (1007) *Cops and Robbers on Planar Graphs.* **Aaron J Maurer***, Carleton College, **John M McCauley**, Haverford College, and **Silviya D Valeva**, Mount Holyoke College (1067-P1-1717)

1:20PM *Bachet's problem: as few weights to*
► (1008) *weigh them all.*
Edwin O'Shea, University College, Cork,
Ireland (1067-P1-1697)

1:40PM *Puzzling Groups.*
► (1009) **Thomas Q. Sibley**, St. John's
University/College of St. Benedict
(1067-P1-474)

2:00PM *Solitaire Mancala.* Preliminary report.
► (1010) **Anthony Tongen***, **Laura Taalman** and
Roger J Thelwell, James Madison
University (1067-P1-2011)

2:20PM *Connection Games and Sperner's Lemma.*
► (1011) **David E Molnar**, Felician College
(1067-P1-77)

2:40PM *Turn the Tide: A Game for*
(1012) *Undergraduate Research Projects.*
Catherine Stenson, Juniata College
(1067-P1-2333)

3:00PM *Heartless Poker.*
► (1013) **Dominic Lanphier***, Western Kentucky
University, and **Laura Taalman**, James
Madison University (1067-P1-1684)

3:20PM *Big Bucks, No Whammies: An*
► (1014) *Investigation of "Press Your Luck".*
Preliminary report.
Anthony DeLegge, Benedictine
University (1067-P1-299)

3:40PM *The Monty Hall Problem, Reconsidered.*
► (1015) **Jason Rosenhouse**, James Madison
University (1067-P1-1701)

**MAA Session on Treasures from the Past:
Using Primary Sources in the Classroom**

1:00 PM – 4:15 PM   Great Ballroom
E, 5th Floor, Sheraton

Organizers: **Amy E. Shell-Gellasch**,
Beloit College

Daniel E. Otero, Xavier
University

David J. Pengelley, New
Mexico State University

1:00PM *Abstract awakenings in algebra:*
► (1016) *Teaching and learning group theory*
through the works of Lagrange, Cauchy,
and Cayley.
Janet Heine Barnett, Colorado State
University - Pueblo (1067-W1-1475)

1:20PM *From Babylonian Table Texts to*
► (1017) *Abstractions.*
Stuart Anderson, Texas A&M
University-Commerce (1067-W1-1531)

1:40PM *Treasures from the Americas: Two*
► (1018) *Examples of Arithmetic as It Is No Longer*
Done. Preliminary report.
Bruce S. Burdick, Roger Williams
University (1067-W1-2153)

2:00PM *The Mathematics of Albrecht Dürer.*
► (1019) **Andrius Tamulis**, Governors State
University (1067-W1-2132)

2:20PM *Reviewing Logs through the Resolution of*
► (1020) *Two Different Published Algebraic*
Representations of Napier's Logarithm.
Andy D. Martin, Kentucky State
University (1067-W1-1048)

2:40PM *Isaac Barrow's Proof of the Fundamental*
(1021) *Theorem of Calculus.*
Colin Bryan Powell McKinney, Bradley
University (1067-W1-239)

3:00PM *Newton's subjunctive G-flat opus.*
► (1022) **Andrew Simoson**, King College
(1067-W1-617)

3:20PM *Partial Fractions in Euler's Institutiones*
► (1023) *calculi differentialis.*
William Dunham, Muhlenberg College
(1067-W1-659)

3:40PM *Mathematics of Non-Western*
(1024) *Civilizations: A New Course for Majors*
and Nonmajors Alike.
Jeff Suzuki, Brooklyn College
(1067-W1-375)

4:00PM *Multiple Paths to Mathematics Practice*
► (1025) *in al-Kashi's Key to Arithmetic: A*
Preliminary Report. Preliminary report.
Osama O. Taani, New Mexico State
University (1067-W1-1184)

**MAA Session on the Mathematics of
Sustainability**

1:00 PM – 4:00 PM   Rhythms I, 2nd Floor, Sheraton

Organizers: **Elton Graves**, Rose-Hulman
Institute of Technology

Peter T. Otto, Willamette
University

1:00PM *Teaching Non-Science Majors Basic*
(1026) *Modeling -A Cluster of Courses Focused*
on Climate Change. Preliminary report.
Amy Kelley* and **Julia Metzker**, Georgia
College & State University (1067-Q1-579)

1:20PM *Math and Social Justice: Improving the*
► (1027) *world with semester projects in a liberal*
arts math course.
David Kung, St. Mary's College of
Maryland (1067-Q1-2344)

1:40PM *Global Warming-Based Calculus.*
► (1028) Preliminary report.
Andrew E Long, Northern Kentucky
University (1067-Q1-1740)

2:00PM *Do sustainability problems in*
► (1029) *mathematics really affect student*
attitudes? Preliminary report.
Jeremy Case, Taylor University
(1067-Q1-2140)

2:20PM *Climate change and the mathematics of*
(1030) *sustainability of student projects for*
calculus and statistics courses.
Lily S. Khadjavi, Loyola Marymount
University (1067-Q1-1878)

2:40PM *Math in the City: A hands-on*
► (1031) *learning experience with projects on*
sustainability. Preliminary report.
Stephen G Hartke* and **Petronela Radu**,
Univ of Nebraska-Lincoln (1067-Q1-156)

3:00PM Discussion.

MAA General Contributed Paper Session, VI

1:00 PM – 3:55 PM   St. Claude, 3rd
                                    Floor, JW Marriott

Organizers: **Kristen Meyer**, Wisconsin
            Lutheran College

            Thomas R. Hagedorn, The
            College of New Jersey

1:00PM *What to Do on Day One in Calculus One.*
(1032) **Jim Fulmer*** and **Tom McMillan**,
        University of Arkansas at Little Rock
        (1067-Z1-2061)

1:15PM *The Alpha and the Omega of 1st Year*
► (1033) *Calculus.*
        Carl V Lutzer, Rochester Institute of
        Technology (1067-Z1-2411)

1:30PM *Using Wolfram|Alpha in finite*
► (1034) *mathematics and applied calculus.*
        Preliminary report.
        Raymond N. Greenwell*, Hofstra
        University, and **Nathan P. Ritchey**,
        Youngstown State University
        (1067-Z1-402)

1:45PM *Teaching a first semester Calculus class*
► (1035) *entirely through Inquiry Based Learning.*
        Preliminary report.
        David Crombecque, Gettysburg College
        (1067-Z1-1763)

2:00PM *Strategies of Involving Students in*
► (1036) *Teaching Calculus.*
        Jinfeng Wei, Maryville University of St.
        Louis (1067-Z1-2160)

2:15PM *Calculus Instructors' Responses to Prior*
► (1037) *Knowledge Errors.*
        Jana R. Talley, Jackson State University
        (1067-Z1-1649)

2:30PM *Enhancing Student Learning in Calculus*
► (1038) *Through Subject-Oriented Projects.*
        Preliminary report.
        Long Wang* and **Kai Qian**, Southern
        Polytechnic State University
        (1067-Z1-2329)

2:45PM *Using Calculus to Model Aspects of the*
► (1039) *2010 Gulf Oil Spill.* Preliminary report.
        Barbara P Gonzalez and **Melanie
        A Pivarski***, Roosevelt University
        (1067-Z1-2238)

3:00PM *Height variations with change of*
(1040) *variables.*
        Justin Edward Sukiennik, University of
        Minnesota (1067-Z1-2314)

3:15PM *Enhancing Calculus with Technology*
► (1041) *Labs, and getting your students to like it!*
        Stanley F. Florkowski, United States
        Military Academy (1067-Z1-954)

3:30PM *Using a data modeling project to enhance*
► (1042) *the teaching of the derivative.*
        Murray H Siegel, Arizona State
        University (1067-Z1-194)

3:45PM *Applications of Calculus to Game Theory:*
► (1043) *The Prisoners' Dilemma.*
        Lee J Stemkoski, Adelphi University
        (1067-Z1-1795)

SIAM Minisymposium on Combinatorial Optimization, II

1:00 PM – 3:55 PM   Bayside A, 4th Floor, Sheraton

Organizers: **David Hartvigsen**,
            University of Notre Dame

            Donald Wagner, Office of
            Naval Research

1:00PM *Maximum Disjoint Paths and Flow-Cut*
► (1044) *Gaps.* Preliminary report.
        Chandra Chekuri, University Illinois
        Urbana-Champagne, **Sanjeev Khanna**,
        University of Pennsylvania, **Loic
        Seguin-Charbonneau**, Royal Military
        College, St Jean sur Richelieu, and
        Burce Shepherd*, McGill University
        (1067-90-1217)

1:30PM *An $O(n^3)$ algorithm for the weighted*
(1045) *stable set problem on claw-free graphs.*
        Gianpaolo Oriolo*, **Yuri Faenza**,
        Universita' di Roma Tor Vergata,
        and **Gautier Stauffer**, Institut de
        Mathematiques de Bordeaux, Universite
        de Bordeaux 1 (1067-90-809)

2:00PM *Thin spanning trees, conductances,*
(1046) *nowhere zero flows, and the traveling
        salesman problem.*
        Michel X. Goemans, Massachusetts
        Institute of Technology (1067-05-1055)

2:30PM *The Maximum-weight Stable Matching*
(1047) *Problem.*
        Xujin Chen, Chinese Academy of
        Sciences, **Guoli Ding***, LSU, **Xiaodong
        Hu**, Chinese Academy of Sciences, and
        Wenan Zang, The University of Hong
        Kong (1067-05-1045)

3:00PM *Minimizing the sum of weighted*
(1048) *completion times in a concurrent open
        shop.*
        Monaldo Mastrolili, IDSIA, **Maurice
        Queyranne**, University of British
        Columbia, **Andreas S. Schulz**,
        Massachusetts Institute of Technology,
        Ola Svensson, KTH Computer Science
        and Communication, and **Nelson A.
        Uhan***, Purdue University (1067-90-438)

3:30PM *Polyhedral and Algorithmic Results for*
(1049) *1-restricted Simple 2-matchings.*
        David Hartvigsen*, University of Notre
        Dame, and **Yanjun Li**, Purdue University
        (1067-90-998)

SIGMAA RUME Session on Research on the Teaching and Learning of Undergraduate Mathematics, II

1:00 PM – 4:55 PM   **St. Jerome, 3rd Floor, JW Marriott**

Organizers: **Sean Larsen**, Portland State University

Natasha M. Speer, University of Maine

Stacy Brown, Pitzer College

1:00PM ► (1050) *Blending Inquiry-Based Learning and Computer-Assisted Instruction in Algebra.* **John C Mayer*** and **William O. Bond**, University of Alabama at Birmingham (1067-Z5-1376)

1:20PM ► (1051) *Quantitative Reasoning and Students' Approaches to Solving Novel Problems.* **Kevin C. Moore**, University of Georgia (1067-Z5-1677)

1:40PM ► (1052) *Modeling Mathematical Behaviors; Making Sense of Traditional Teachers of Advanced Mathematics Courses Pedagogical Moves.* **Tim P Fukawa-Connelly**, The University of New Hampshire (1067-Z5-1451)

2:20PM ► (1053) *Reading Online Mathematics Textbooks, A Preliminary Study.* Preliminary report. **Mary D Shepherd*** and **Carla van de Sande**, Arizona State University (1067-Z5-2194)

2:40PM ► (1054) *Individual and Collective Analysis of the Genesis of Student Reasoning regarding the Invertible Matrix Theorem in Linear Algebra.* **Megan J Wawro**, San Diego State University & University of California, San Diego (1067-Z5-1337)

3:00PM ► (1055) *Frameworks for Understanding Undergraduate Students' Conceptions of the Equals Sign.* **Aaron Weinberg**, Ithaca College (1067-Z5-952)

3:40PM ► (1056) *An Exploration of the Transition to Graduate School in Mathematics.* Preliminary report. **Sarah L. Marsh**, University of Oklahoma (1067-Z5-1245)

4:00PM (1057) *Differences in Beliefs and Teaching Practices between International and U.S. Domestic Mathematics Teaching Assistants.* Preliminary report. **Minsu Kim**, The University of Oklahoma (1067-Z5-1119)

4:20PM ► (1058) *Improving Pass Rates in Mathematics using Interactive Software - Revisited.* **Michelle DeDeo**, Univ. of North Florida (1067-Z5-60)

4:40PM (1059) *Reasoning about Functions of Two-Variables: A Case Study.* **Eric D Weber**, Arizona State University (1067-Z5-343)

Joint Committee on Women in the Mathematical Sciences Panel Discussion

1:00 PM – 2:30 PM   **Oak Alley Room, 4th Floor, Sheraton**

Women in the mathematical sciences: Looking back, looking forward.

Organizers: **Terrell Hodge**, Western Michigan University

Maura Mast, University of Massachusetts Boston

Moderator: **Terrell Hodge**

Panelists: **Mary Gray**, American University

Jim Lewis, University of Nebraska-Lincoln

Jill Pipher, Brown University

Jean Taylor, Rutgers University

Marie Vitulli, University of Oregon

AMS Conversation on Nonacademic Employment

1:00 PM – 2:30 PM   **La Galerie 5, 2nd Floor, Marriott**

Moderator: **C. Allen Butler**, Daniel H. Wagner Associates, Inc.

MAA Panel Dicussion

1:00 PM – 3:00 PM   **La Galerie 6, 2nd Floor, Marriott**

Good intentions are necessary but not sufficient: Steps toward best practices in mentoring underrepresented students.

Organizer: **James H. Curry**, Arizona State University

Panelists: **Carlos Castillo-Chavez**, Arizona State University

A. G. (Loek) Helminck, North Carolina State University

Rhonda Hughes, Bryn Mawr College

Philip Kutzko, The University of Iowa

M. Helena Noronha, California State University, Northridge

MAA Panel Discussion

1:00 PM – 2:20 PM   **Mardi Gras D, 3rd Floor, Marriott**

This could be YOUR graduate research!

Organizer: **Aaron Luttman**, Clarkson University

Moderator: **Ralucca Gera**, Naval Postgraduate School

Panelists: **Timothy Chartier**, Davidson College

Steven Horton, U. S. Military Academy at West Point

Keri Kornelson, University of Oklahoma

MAA Panel Discussion

1:00 PM – 3:00 PM   Armstrong Ballroom, 8th Floor, Sheraton

Mathematical culture and mathematical life.

Organizers: **Reuben Hersh**, University of New Mexico

Vera John-Steiner, University of New Mexico

Panelists: **Lenore Blum**, Carnegie-Mellon University

Philip J. Davis, Brown University

Nathaniel Dean, Texas State University, San Marcos

Reuben Hersh

Gizem Karaali, Pomona College

SIGMAA on Statistics Education/ASA-MAA Joint Committee on Undergraduate Statistics Panel Discussion

1:00 PM – 2:20 PM   Mardi Gras BC, 3rd Floor, Marriott

Report from the International Conference on Teaching Statistics: A world view of statistics education.

Organizers: **John McKenzie**, Babson College

Michael A. Posner, Villanova University

Panelists: **Rob Carver**, Stonehill College

Katherine Halvorsen, Smith College

John McKenzie

Milo Schield, Augsburg College

Gail Burrill, Michigan State University

MAA Committee on Technologies in Mathematics and Education/WEB SIGMAA Panel Discussion

1:00 PM – 2:20 PM   La Galerie 2, 2nd Floor, Marriott

Assessment of learning in an age of technology.

Organizers: **Michael B. Scott**, California State University Monterey Bay

Jason Aubrey, University of Missouri

Panelists: **Andrew G. Bennett**, Kansas State University

Gavin LaRose, University of Michigan

Alison Marble Ahlgren, University of Illinois at Urbana-Champaign

Summer Program for Women in Mathematics (SPWM) Reunion

1:00 PM – 4:00 PM   Gallery Ballroom, 1st Floor, Sheraton

Organizer: **Murli M. Gupta**, The George Washington University

AMS Session on Fluid Mechanics, II, and Geophysics

1:15 PM – 3:55 PM   Cornet Room, 8th Floor, Sheraton

1:15PM (1060) *Numerical Simulation of Oblique and Head-on Collision.*
Leon Kaganovskiy*, New College of Florida, and **Robert Krasny**, University of Michigan, Ann Arbor (1067-76-243)

1:30PM (1061) *An Integrative Model of Hyperactivated Sperm Motility.*
Sarah D Olson*, Tulane University, **Susan Suarez**, Cornell University, and **Lisa Fauci**, Tulane University (1067-76-216)

1:45PM ▶ (1062) *Deposition Patterns of Nanoparticles in Human Nasal Passages.* Preliminary report.
Rebecca A Segal, Virginia Commonwealth University (1067-76-1928)

2:00PM (1063) *New Minimal Representation of Self Propelled Swimmers in Stokes Flow Using Regularized Fundamental Solutions.*
Priya Shilpa Boindala, Georgia Gwinnett College (1067-76-250)

2:15PM ▶ (1064) *Modeling the Evaporation of a Tear Film over a Contact Lens.*
Kevin Talbott, George Mason University (1067-76-1374)

2:30PM ▶ (1065) *Numerical Simulation of Fiber Spinning Including Flow-Induced Crystallization.*
David C Szurley, Francis Marion University (1067-76-1655)

2:45PM (1066) *Mathematical model of a liquid jet breakup containing solid particles.*
M. Hameed*, University of South Carolina Upstate, and **J. Morris**, Department of Chemical Engineering, City College of New York (1067-76-1364)

3:00PM ▶ (1067) *Preliminary Report on the Modeling of Surface Velocities and Fault Rotations.* Preliminary report. **Danielle Nicole Gannon***, **Natalie Domelle**, Saint Mary's College, and **Lucy Flesch**, Purdue University (1067-86-150)

3:15PM (1068) *Evolution of a Mushy Zone on a Finite Domain.* Preliminary report. **Nicholas R Gewecke*** and **Tim P Schulze**, University of Tennessee, Knoxville (1067-86-346)

3:30PM (1069) *Estimation of Near Surface Wind Structures in Tornadic Vortices.* **Sean M Crowell***, **Luther White**, University of Oklahoma, and **Louis Wicker**, National Severe Storms Laboratory (1067-86-950)

3:45PM (1070) *A one dimensional algorithm for seismic imaging and inversion: theoretical development and numerical tests.* **Bogdan G. Nita***, **Ashley Ciesla**, Montclair State University, and **Christopher Smith**, The College of New Jersey (1067-86-1887)

MAA Poster Session on Projects Supported by the NSF Division of Undergraduate Education

2:00 PM – 4:00 PM   Napoleon A1-A3, 3rd Floor, Sheraton

Organizer: **Jon Scott**, Montgomery College

2:00PM (1071) *Workshops That Improve Undergraduate Teaching of Mathematics.* **Alex Heidenberg***, **Jerry Kobylski** and **Hilary Fletcher**, United States Military Academy

2:00PM (1072) *Distributome-An Interactive Web-based Resource for Probability Distributions.* **Kyle Siegrist***, University of Alabama in Huntsville, **Ivo Dinov**, University of California, Los Angeles, and **Dennis Pearl**, The Ohio State University

2:00PM (1073) *Mathematics and Social Advocacy.* **Sandra Kingan** and **Jeff Suzuki***, Brooklyn College of CUNY

2:00PM (1074) *The HBCU Retreat and Follow-On Program.* **Don Small***, United States Military Academy, and **Laurette Foster**, Prairie View A&M University

2:00PM (1075) *Teaching Abstract Algebra for Understanding.* **Estrella Johnson*** and **Sean Larsen**, Portland State University

2:00PM (1076) *Math in the City.* **Petronela Radu*** and **Stephen Hartke**, University of Nebraska-Lincoln

2:00PM (1077) *Lurch, Educational Software for Writing Proofs.* **Kenneth G. Monks***, University of Scranton, and **Nathan Carter**, Bentley University

2:00PM (1078) *DIY Modeling–Do It Yourself Modeling and Simulation for STEM Learning.* **Frank Wattenberg***, United States Military Academy, **William C. Bauldry**, Appalachian State University, **Joe Yanik**, Emporia State University, **Keith Erickson**, Georgia Gwinnett College, and **Marion Smith**, Texas Southern University

2:00PM (1079) *Discovering the Art of Mathematics.* **Julian F. Fleron***, **Philip K. Hotchkiss**, **Volker Ecke** and **Christine von Renesse**, Westfield State College

2:00PM (1080) *Quantitative Reasoning in the Contemporary World.* **Caren Diefenderfer***, Hollins University, **Bernard L. Madison**, University of Arkansas, **Stuart Boersma**, Central Washington University, and **Shannon Dingman**, University of Arkansas

2:00PM (1081) *College Ready in Mathematics and Physics Partnership.* **Gay Stewart**, **Bernard L. Madison*** and **Shannon Dingman**, University of Arkansas

2:00PM (1082) *Biology and Mathematics in Population Studies–BioMaPS I and BioMaPS II.* **Donald Adongo***, **K. Renee Fister**, **Terry Derting**, **Chris Mecklin**, **Claire Fuller**, **Kate He**, **Emily Croteau**, **Maeve McCarthy** and **Howard Whiteman**, Murray State University

2:00PM (1083) *Dynamic Visualization Tools for Multivariable Calculus.* **Paul Seeburger**, Monroe Community College

2:00PM (1084) *Enabling Computer Algebra Use in the Undergraduate Abstract Algebra Curriculum.* **Alexander Hulpke**, Colorado State University

2:00PM (1085) *STEM Real World Applications of Mathematics.* **Darren Narayan*** and **William Basener**, Rochester Institute of Technology

2:00PM (1086) *Analysis of Stress in Biological Systems.* **Ben G. Fitzpatrick***, **Thomas Zachariah**, **Wendy Binder**, **Kam Dahlquist** and **Gary Kuleck**, Loyola Marymount University

2:00PM (1087) *Paradigms in Physics: Interactive Electromagnetism Curricular Materials.* **Tevian Dray***, **Corinne A. Manogue** and **Emily H. van Zee**, Oregon State University

2:00PM (1088) *Project MOSAIC: Integrating Modeling, Statistics, Calculus and Computation in the Early Undergraduate Curriculum.* **Daniel Kaplan**, Macalester College

2:00PM (1089) *Undertaking a Purposeful and Effective Departmental Review.* **Nancy Baxter Hastings**, Dickinson College

2:00PM (1090) *Flash Applets for WeBWork Online Homework System.* **Barbara Margolius*** and **Yuping Wu**, Cleveland State University

101

2:00PM *Research-Based Video for Teaching*
(1091) *Undergraduate Proof.*
Jim Sandefur, Georgetown University,
Kay Somers, Moravian College, and
Connie Campbell*, Millsaps College

2:00PM *An Integrative Analysis of Human*
(1092) *Cancer: Exploiting the Synergy of*
Mathematical and Molecular Biological
Approaches in Studying a Complex
Problem.
Jeffrey Forrester* and **Michael P.
Roberts**, Dickinson College

2:00PM *WeBWorK: Improving Student Success in*
(1093) *Mathematics.*
Arnold Pizer*, **Mike Gage**, **Vicki Roth**,
University of Rochester, and **Michael
Pearson**, Mathematical Association of
America

2:00PM *MathVote: Teaching Mathematics with*
(1094) *Classroom Voting.*
Jean McGivney-Burelle*, University of
Hartford, **Kathy Shay**, Middlesex County
College, **Ann Stewart**, Hood College,
Lahna VonEpps, Columbia College, **Kelly
Cline**, **Holly Zullo**, Carroll College, and
Christopher Storm, Adelphi University

2:00PM *Maplets for Calculus.*
(1095) **Douglas B. Meade***, University of South
Carolina, **Philip B. Yasskin** and **Matthew
Barry**, Texas A & M University

2:00PM *UTMOST: Undergraduate Teaching of*
(1096) *Mathematics with Open Software and*
Textbooks.
Robert Beezer*, University of Puget
Sound, **Jason Grout**, Drake University,
Marja-Liisa Hassi, University of Colorado
at Boulder, **Thomas Judson**, Stephen F.
Austin State University, **Kiran Kedlaya**,
Massachusetts Institute of Technology,
Sandra Laursen, University of Colorado
at Boulder, and **William Stein**, University
of Washington, Seattle

2:00PM *Discovery Learning Projects in*
(1097) *Introductory Statistics.*
Brad Bailey* and **Dianna Spence**, North
Georgia College & State University

2:00PM *Mathematics Partnering with Computer*
(1098) *Sciences to Improve Calculus Instruction*
and Learning.
Calvin L. Williams*, **Marilyn Reba**, **Roy
Pargas** and **Allen Guest**, Clemson
University

2:00PM *Supplying Undergraduate Biology and*
(1099) *Mathematics Education and Research*
Group Experiences (SUBMERGE) to
Students at the University of Michigan:
Understanding Diseases with Math
Biology.
Patrick Nelson, **Trachette Jackson**,
Michael Simonov* and **Helen Shi**,
University of Michigan

2:00PM *The Integrative Biomathematics Learning*
(1100) *and Engagement Network for Diversity*
(iBLEND) Project at North Carolina A&T
State University.
Gregory D. Goins*, **Mingxiang Chen**, **C.
Dinitra White**, **Dominic P. Clemence** and
Thomas C. Redd, North Carolina A&T
State University

2:00PM *Problems of the Week as Teacher*
(1101) *Education Resources.*
Jason Silverman*, Drexel University, and
Chrystal Dean, Appalachian State
University

2:00PM *The Math Forum's Virtual Fieldwork*
(1102) *Sequence.*
Wesley Shumar*, **Jason Silverman**,
Drexel University, **Stephen Weimar** and
Ellen Clay, The Math Forum at Drexel

2:00PM *Preservice Teachers' Learning and*
(1103) *Motivation in Working with The Math*
Forum's Virtual Fieldwork Sequence.
K. Ann Renninger*, **Mark Chin**, **Dennis
Fan** and **Ming Cai**, Swarthmore College

2:00PM *Assessing Open-ended Mathematics*
(1104) *Writing: The Math Image Wiki Page*
Coding Scheme (MI-CS).
Anna M. Phillips*, **Abram Lipman** and
K. Ann Renninger, Swarthmore College

2:00PM *MBUR (Mathematical Biology and*
▶ (1105) *Undergraduate Research): Modeling the*
Dynamics of Riparian Forests and
Landforms.
Lindsay Blazsek, **Lisa M. Curll**, **Thomas
P. Diggins** and **George T. Yates***,
Youngstown State University

2:00PM *Texas A&M UBM: Student research*
(1106) *experience is the key.*
Jay Walton, **May Boggess***, **Masami
Fujiwara**, Texas A&M University, **Kaibin
Fu** and **Harriette Block**, Prairie View A&M
University

2:00PM *Texas A&M Math REU: The 3 X 5 Model.*
(1107) **Jay Walton** and **Al Boggess***, Texas A&M
University

2:00PM *Interdisciplinary Training in*
(1108) *Mathematical Biology Through*
Team-based Undergraduate Research
and Courses.
Jason Miller* and **Pamela Ryan**, Truman
State University

2:00PM *Broadening Participation in STEM*
(1109) *Through Integrative Experiences For*
First-Year Students.
Jason Miller, Truman State University

2:00PM *University Scholars in STEM.*
(1110) **Leah Gold***, **Barbara K. Modney**, **Daniel
Simon**, **Lauren Davis**, **Carol Hodanbosi**
and **Mark Tumeo**, Cleveland State
University

2:00PM *Quantitative Skills in Biology through*
(1111) *Scientific Inquiry at James Madison*
University.
Brian Walton*, **Anthony Tongen**,
Nusrat Jahan and **Reid Harris**, James
Madison University

2:00PM (1112) *Mathematical Methods for Biology and Medicine.*
Glenn Ledder, University of Nebraska Lincoln

2:00PM (1113) *Research, Dissemination, and Faculty Development of Inquiry-Based Learning (IBL) Methods in the Teaching and Learning of Mathematics.*
Michael Starbird*, The University of Texas at Austin, **Paul J. Sally**, **John Boller**, University of Chicago, **Ralf Spatzier**, University of Michigan, **Sandra Laursen**, University of Colorado at Boulder, **John D. Moore** and **William B. Jacob**, University of California, Santa Barbara

2:00PM (1114) *GeoGebra Applets for Elementary Statistics.*
David Gurney, Southeastern Louisiana University

2:00PM (1115) *Motivation and Learning in an Online Unmoderated Mathematics Workshop for Teachers.*
K. Ann Renninger*, **Ming Cai**, **M. C. Lewis**, **M. Adams**, Swarthmore College, and **K. Ernst**, Drexel University

2:00PM (1116) *CELTIC: Calculus for Elementary Teachers: An Innovative Context.*
Karen Keene*, **Alina Duca** and **Paola Szatjn**, North Carolina State University

2:00PM (1117) *MINDSET: Mathematics Instruciton using Decision Science and Engineering Tools.*
Robert Young, **Karen Keene***, North Carolina State University, **Kenneth Chelst**, **Thomas Edwards**, Wayne State University, and **David Pugalee**, The University of North Carolina at Charlotte

2:00PM (1118) *An Accessible Online Resource for Mathematics Students and Instructors.*
Lila F. Roberts, Clayton State University

2:00PM (1119) *Online Statistics Education: An Interactive Multimedia Course of Study II.*
David M. Lane*, Rice University, and **Camille Peres**, University of Houston, Clear Lake Campus

2:00PM (1120) *Biocalculus: Text Development, Dialog, and Assessment.*
Timothy Comar* and **Brenda Alberico**, Benedictine University

2:00PM (1121) *MAA's Interactive Online Calculus Text.* **David Smith*** and **Lang Moore**, Duke University

2:00PM (1122) *Resources for Courses: MathDL's New Collection of Online Materials.*
Lang Moore*, Duke University, and **Tom Leathrum**, Jacksonville State University

2:00PM (1123) *Empowering Student Learning in Mathematical Analysis.*
Barbara A. Shipman, The University of Texas at Arlington

2:00PM (1124) *PREP: MAA's Professional Development Program.*
J. Michael Pearson, Mathematical Association of America, **Nancy Baxter Hastings**, Dickinson College, **Barbara Edwards**, Oregon State University, **Nathaniel Dean**, Texas State University San Marcos, **Virginia Buchanan**, Hiram College, **Mike Brilleslyper**, United States Air Force Academy, and **Jon Scott***, Montgomery College

2:00PM (1125) *Modern Biology, Modern Mathematics, and Modern Solutions: Moving Biomathematics Education Beyond Calculus.*
Raina Robeva*, Sweet Briar College, **Terrell Hodge**, Western Michigan University, **Robin Davies**, Sweet Briar College, and **Alexander Enyedi**, Western Michigan University

2:00PM ▶ (1126) *The Math S-STEM Program for Attracting and Retaining Scholars in the Mathematical Sciences.*
Alexandra Kurepa, North Carolina A&T State University

2:00PM ▶ (1127) *The Links Between Smale's Mean Value Conjecture and Convergence.* Preliminary report.
Hayley M Miles-Leighton, University of California, San Diego (1067-30-2386)

2:00PM ▶ (1128) *Realization Relationships Between Communication Models.* Preliminary report.
Leilani Hendrina Gilpin, University of California, San Diego (1067-90-2390)

AMS Invited Address

2:15 PM – 3:05 PM **Great Ballroom A-C, 5th Floor, Sheraton**

(1129) *Self-organization in human, biological, and artificial systems.*
Andrea L. Bertozzi, UCLA (1067-92-9)

AMS Session on Differential Geometry

2:15 PM – 3:55 PM **Rosalie, 3rd Floor, JW Marriott**

2:15PM (1130) *Curve Matching Using Integral Invariants.* Preliminary report.
Susan Crook, North Carolina State University (1067-53-1958)

2:30PM ▶ (1131) *Facial Recognition Using Conformal Geometry.*
Meghan Anne Galiardi, Stonehill College, **Miguel Angel Lugo***, Florida State University, and **Shawn Leo Witte**, Central Michigan University (1067-53-145)

2:45PM (1132) *Moving Frames and The Equivalence of Homogeneous Polynomials.* Preliminary report.
Thomas H. Wears, North Carolina State University (1067-53-166)

3:00PM *A dense G-delta of Riemannian metrics*
(1133) *without the finite blocking property.*
Wah-Kwan Ku* and **Marlies Gerber**,
Indiana University (1067-53-1156)

3:15PM *Distance comparison and the Dirichlet*
▶ (1134) *problem for curve shortening flow in*
convex domains. Preliminary report.
Paul T Allen, **Adam Layne** and
Katharine Tsukahara*, Lewis & Clark
College, Portland, Oregon (1067-53-193)

3:30PM *Remarks on some Non-Linear Heat Flows*
(1135) *in Kähler Geometry.*
Donovan C McFeron, Ramapo College of
New Jersey (1067-53-1232)

3:45PM *The Geometry of Simple Singularities.*
(1136) Preliminary report.
Joanna K Nelson, University of
Wisconsin-Madison (1067-53-2183)

MAA Committee on the Teaching of Undergraduate Mathematics Panel Discussion

2:35 PM – 3:55 PM   La Galerie 2,
                              2nd Floor, Marriott

Calculus reform: 25 years later.
Organizers: **Steve Benson**, Lesley
University
Joe Yanik, Emporia State
University
Marilyn Carlson, Arizona
State University
Ellen Kirkman, Wake Forest
University
Panelists: **Steve Benson**
Tom Dick, Oregon State
University
Deborah Hughes Hallett,
University of Arizona
Judy Holdner, Kenyon
College
Paul Zorn, St. Olaf College

MAA Panel Discussion

2:35 PM – 3:55 PM   Mardi Gras D,
                              3rd Floor, Marriott

Mathematicians and teachers:
Professional development and outreach
groups.
Organizers: **James King**, University of
Washington
Gail Burrill, Michigan State
University
Panelists: **Darryl Yong**, Harvey Mudd
University
Brian Hopkins, St. Peters
College
James King
Harvey Keynes, University
of Minnesota

Brynja Kohler, Utah State
University

SIGMAA on Mathematical and Computational Biology-SIGMAA on Statistics Education-ASA/MAA Joint Committee on Undergraduate Statistics Panel Discussion

2:35 PM – 3:55 PM   Mardi Gras BC,
                              3rd Floor, Marriott

Creating/improving the
biomathematics/biostatistics course.
Organizers: **Michael A. Posner**,
Villanova University
Raina Robeva, Sweet Briar
College
Holly Gaff, Old Dominion
Univevrsity
Panelists: **Pam Ryan**, Truman
University
Fred Adler
Laurie Heyer, Davidson
College
Deborah Nolan, University
of California, Berkeley

AMS Committee on the Profession Panel Discussion

2:45 PM – 4:15 PM   Mardi Gras EFGH,
                              3rd Floor, Marriott

What I wish I had known before applying
for a job.
Moderator: **Eric M. Friedlander**,
University of Southern
California
Panelists: **Ruth M. Charney**, Brandeis
University
Erin E. Corman, National
Security Agency
Mark L. Huber, Claremont
McKenna College
Zachary Miner, University of
Texas at Austin
Malabika Pramanik,
University of British
Columbia

AMS Invited Address

3:20 PM – 4:10 PM   Great Ballroom
                          A-C, 5th Floor, Sheraton

(1137) *Potential Theory meets Geometric*
Measure Theory.
Tatiana Toro, University of Washington
(1067-31-5)

MAA Session on Journals and Portfolios: Tools in Learning Mathematics?

3:20 PM – 4:15 PM   **La Galerie 6, 2nd Floor, Marriott**

Organizer: **Sarah L. Mabrouk**, Framingham State University

3:20PM *Learning Logs in College Algebra:*
► (1138) *A Window to Student Perceptions of Learning Progress and Student Engagement.*
Carrie A Campbell, Lincoln, NE (1067-M1-1916)

3:40PM *Using Journals and Portfolios in a Modern*
► (1139) *Geometry Course.* Preliminary report.
G Maria Fung, Worcester State University (1067-M1-2263)

4:00PM *Proof Writing and Portfolios in a Bridge*
► (1140) *Course.*
Penelope Dunham, Muhlenberg College (1067-M1-520)

Joint Prize Session

4:25 PM – 5:25 PM   **Great Ballroom A-C, 5th Floor, Sheraton**

SIGMAA on Environmental Mathematics Guest Lecture and Business Meeting

5:30 PM – 6:30 PM   **Great Ballroom E, 5th Floor, Sheraton**

5:30PM *Startling Parallels: Macondo/BP in 2011*
(1141) *and Bhopal/UC in 1984.*
Charles Hadlock, Bentley College

6:00PM Business Meeting.

Joint Prize Session Reception

5:30 PM – 6:30 PM   **Armstrong Ballroom, 8th Floor, Sheraton**

MAA Reunion for Those Interested in Refocusing College Algebra

5:30 PM – 7:30 PM   **Grand Couteau Room, 5th Floor, Sheraton**

Organizer: **Donald B. Small**, U. S. Military Academy

SIGMAA on Research in Undergraduate Mathematics Education Business Meeting

5:45 PM – 6:30 PM   **St. Jerome, 3rd Floor, JW Marriott**

SIGMAA Statistics Education Business Meeting and Reception

5:45 PM – 7:15 PM   **La Galerie 6, 2nd Floor, Marriott**

MAA Two-Year College Reception

5:45 PM – 7:00 PM   **La Galerie 2, 2nd Floor, Marriott**

SIGMAA on Mathematical and Computational Biology Business Meeting

6:00 PM – 7:00 PM   **Rhythms I, 2nd Floor, Sheraton**

SIGMAA on Teaching Advanced High School Mathematics Business Meeting

6:00 PM – 7:00 PM   **Mardi Gras BC, 3rd Floor, Marriott**

SIGMAA on Mathematical and Computational Biology Guest Lecture

7:00 PM – 7:45 PM   **Rhythms I, 2nd Floor, Sheraton**

7:00PM *The biofluiddynamics of swimming and*
(1142) *pumping: Recent insights.*
Lisa Fauci, Tulane University (1067-A0-2432)

Young Mathematicians' Network Open Forum

7:30 PM – 8:30 PM   **Maurepas Room, 3rd Floor, Sheraton**

All meeting participants, including undergraduates and graduate students, are welcome to discuss topics and issues affecting young mathematicians.

Saturday, January 8

Joint Meetings Registration

7:30 AM – 4:00 PM   **Across from La Galerie 4, 2nd Floor, Marriott**

AMS-SIAM Special Session on Mathematics of Computation: Algebra and Number Theory, III

8:00 AM – 10:50 AM   **Napoleon D2, 3rd Floor, Sheraton**

Organizers: **Gregor Kemper**, Technische Universität München
Michael J. Mossinghoff, Davidson College
Igor E. Shparlinski, Macquarie University

8:00AM *Four dimensional algebraic tori.*
(1143) Preliminary report.
Nicole Marie Lemire, University of Western Ontario (1067-14-1594)

8:30AM
(1144)
Families of free hyperplane arrangements. Preliminary report.
Will Traves* and **Max Wakefield**, U.S. Naval Academy (1067-14-711)

9:00AM
▶ (1145)
Computations with basic algebras. Preliminary report.
Jon F. Carlson, University of Georgia (1067-16-372)

9:30AM
(1146)
Computing Conjugacy Classes of Elements and Subgroups in Matrix Groups.
Alexander Joerg Hulpke, Colorado State University (1067-20-147)

10:00AM
(1147)
Computing isometry groups of Hermitian maps.
James B Wilson*, The Ohio State University, and **Peter A Brooksbank**, Bucknell University (1067-20-119)

10:30AM
(1148)
Toward Numerical Primary Decomposition.
Anton Leykin, Georgia Tech (1067-14-1180)

AMS-AWM Special Session on Hopf Algebras and Their Representations, I

8:00 AM – 10:50 AM
Nottoway Room, 4th Floor, Sheraton

Organizers: **M. Susan Montgomery**, University of Southern California
Siu-Hung Ng, Iowa State University
Sarah J. Witherspoon, Texas A&M University

8:00AM
(1149)
Right coideal subalgebras of Nichols algebras and the Duflo order of the Weyl groupoid.
Hans-Juergen Schneider*, Ludwig-Maximilians-Universitaet Muenchen, and **Istvan Heckenberger**, Philipps-Universitaet Marburg (1067-20-1153)

8:30AM
(1150)
Conjugacy classes for Hopf algebras.
Miriam Cohen*, Ben Gurion University, and **Sara Westreich**, Bar Ilan University (1067-16-422)

9:00AM
(1151)
Secondary cohomology for Hopf algebras.
Mihai D. Staic, DePaul University (1067-16-618)

9:30AM
(1152)
Classification of isomorphism types of a class of abelian extensions, by Y. Kashina and L. Krop.
Leonid Krop* and **Yevgenia Kashina**, DePaul University (1067-16-429)

10:00AM
(1153)
On classification of certain abelian extensions. Preliminary report.
Yevgenia Kashina* and **Leonid Krop**, DePaul University (1067-16-2356)

10:30AM
(1154)
On Multigraded combinatorial Hopf algebras.
Samuel K Hsiao, Bard College, and **Gizem Karaali***, Pomona College (1067-16-793)

AMS Special Session on Formal Mathematics for Mathematicians: Developing Large Repositories of Advanced Mathematics, I

8:00 AM – 10:50 AM
Conde, 3rd Floor, JW Marriott

Organizers: **Krystyna M. Kuperberg**, Auburn University
Andrzej Trybulec, University of Bialystok
Artur Kornilowicz, University of Bialystok
Adam Naumowicz, University of Bialystok

8:00AM
(1155)
The GOEDEL Program.
Johan G. F. Belinfante, Georgia Institute of Technology (1067-03-724)

8:30AM
(1156)
Modules for a Large Library of Formalized Mathematics. Preliminary report.
William M Farmer, McMaster University (1067-03-1782)

9:00AM
(1157)
Automated Reasoning for Mizar.
Josef Urban, Radboud University Nijmegen (1067-03-860)

9:30AM
(1158)
The HOL Light formalization of Euclidean space.
John R Harrison, Intel Corporation (1067-03-1711)

10:00AM
(1159)
Formalization of Lattice Theory in Mizar.
Adam Grabowski, University of Bialystok, Poland (1067-06-1493)

10:30AM
▶ (1160)
The Kepler Conjecture after 400 years: from conjecture to formal proof.
Thomas C. Hales, University of Pittsburgh (1067-03-854)

AMS Special Session on Multivariable Operator Theory, I

8:00 AM – 10:50 AM
Maurepas, 3rd Floor, JW Marriott

Organizers: **Ronald G. Douglas**, Texas A&M University
Gelu F. Popescu, University of Texas at San Antonio

8:00AM
(1161)
Canonical Models for Quasi-Free Hilbert Modules.
Ronald G. Douglas*, Texas A & M University, **Yun-Su Kim**, University of Toledo, **Hyun Kwon**, Seoul National University, and **Jaydeb Sarkar**, University of Texas at San Antonio (1067-47-593)

8:30AM
(1162)
Function Theory from Tensor Algebras. Preliminary report.
Paul S. Muhly*, University of Iowa, and **Baruch Solel**, Technion (1067-47-580)

9:00AM *Joint Similarity to Operators in*
(1163) *Noncommutative Varieties.*
Gelu F Popescu, The University of Texas
at San Antonio (1067-47-352)

9:30AM *BMO Estimates for the $H^\infty(\mathbb{B}_n)$ Corona*
(1164) *Problem.*
Serban Costea, Timisoara, Romania, **Eric
T. Sawyer**, McMaster University, and
Brett D. Wick*, Georgia Institute of
Technology (1067-32-538)

10:00AM *The c*-envelope of a tensor algebra*
(1165) *revisited.* Preliminary report.
Elias Katsoulis, University of Athens,
Greece and East Carolina University
(1067-47-692)

10:30AM *Hilbert modules and dilation theory.*
(1166) **Ronald G. Douglas**, Texas A&M
university, **Gadadhar Misra**, Indian
Institute of Science, India, and **Jaydeb
Sarkar***, The University of Texas at San
Antonio (1067-47-539)

AMS Special Session on Stochastic Analysis and Mathematical Physics: A Session in Honor of the 80th Birthday of Len Gross, I

8:00 AM – 10:50 AM   **Balcony N, 4th Floor, Marriott**

Organizers: **Bruce K. Driver**, University
of California at San Diego
Maria Gordina, University of
Connecticut
Todd Kemp, Massachusetts
Institute of Technology and
University of California at
San Diego

8:00AM *The space of harmonic sections on*
(1167) *noncompact manifolds.*
Nelia Charalambous, Instituto
Tecnologico Autonomo de Mexico
(1067-58-673)

8:30AM *Stochastic Completeness and Escape Rate*
(1168) *of Brownian Motion on a Riemannian
Manifold.*
Elton P Hsu, Northwestern University
(1067-60-1648)

9:00AM *Vanishing of L^2 harmonic one-forms on*
(1169) *based path spaces of Riemannian
manifolds.*
K. D. Elworthy, University of Warwick.
(1067-58-1088)

9:30AM *A Brownian Motion on the Group of*
(1170) *Diffeomorphisms of the Circle.*
Mang Wu, University of California,
Riverside (1067-60-1009)

10:00AM *Another approach to Lie's third theorem*
(1171) *in infinite dimensions.*
Maria Gordina, University of
Connecticut, **Leonard Gross***, Cornell
University, and **S. G. Rajeev**, University of
Rochester, Physics (1067-22-1404)

10:30AM *Heat kernel measures and critical limits.*
(1172) **Douglas M Pickrell**, University of
Arizona (1067-46-622)

AMS Special Session on Mathematics Related to Feynman Diagrams, I

8:00 AM – 10:45 AM   **Frontenac, 3rd
Floor, JW Marriott**

Organizers: **Victor H. Moll**, Tulane
University
Olivier Espinosa,
Universidad Santa Maria,
Valparaiso

8:00AM *A symbolic summation approach to*
▶ (1173) *Feynman integral calculus.*
Flavia Stan, Tulane University
(1067-40-1231)

9:00AM *Geometrical approach to the evaluation*
(1174) *of Feynman diagrams and its application
to the epsilon-expansion.* Preliminary
report.
Andrei I. Davydychev, Moscow State
University (1067-33-2430)

10:00AM *Patterns in denominators of Feynman*
(1175) *integrals.*
Karen A Yeats, Simon Fraser University
(1067-05-1274)

AMS Special Session on Completely Integrable Systems, Random Matrices, and the Bispectral Problem, I

8:00 AM – 10:50 AM   **Rosalie, 3rd
Floor, JW Marriott**

Organizers: **Bojko Bakalov**, North
Carolina State University
Michael Gekhtman,
University of Notre Dame
Plamen Iliev, Georgia
Institute of Technology
Milen T. Yakimov, Louisiana
State University

8:00AM *Cluster Expansions, Caustics and*
(1176) *Counting Graphs.*
Nicholas M. Ercolani, University of
Arizona (1067-05-885)

8:30AM *Toda lattice hierarchy and*
(1177) *noncommutative geometry.*
Thomas Nevins*, University of Illinois at
Urbana-Champaign, and **David Ben-Zvi**,
University of Texas-Austin (1067-14-875)

9:00AM *Drinfeld-Sokolov reduction and algebras*
(1178) *of chiral differential operators.*
Fyodor Malikov, USC (1067-14-2112)

9:30AM *Norms of eigenfunctions to trigonometric*
(1179) *KZB operators.*
Erik J. Jensen* and **Alexander
Varchenko**, University of North Carolina -
Chapel Hill (1067-82-1229)

10:00AM *Liouville integrability of a class of*
(1180) *integrable spin Calogero-Moser systems
and exponents of simple Lie algebras.*
Luen-Chau Li*, Pennsylvania State
University, University Park, and **Zhaohu
Nie**, Pennsylvania State University ,
Altoona Campus (1067-58-1284)

10:30AM   *Bethe subalgebras of the group algebra*
(1181)   *of the symmetric group.*
          Vitaly Tarasov, Indiana University
          – Purdue University Indianapolis
          (1067-17-2266)

AMS Special Session on Nonlinear Evolution Equations, Analysis, and Geometry, I

8:00 AM – 10:50 AM   **Maurepas Room,**
                                      3rd Floor, Sheraton

          Organizers: **Ralph Saxton**, University of
                        New Orleans
                        Feride Tiglay, Fields
                        Institute

8:00AM   *On the global solutions of the Higgs*
(1182)   *boson equation.*
          Karen Yagdjian, University of Texas-Pan
          American (1067-35-786)

8:30AM   *On the well-posedness of Camassa-Holm*
(1183)   *type equations.*
          Alex A. Himonas, University of Notre
          Dame (1067-35-1778)

9:00AM   *Existence, uniqueness and stability for*
(1184)   *some models of complex fluids.*
          Peter Constantin* and **Weiran Sun**, The
          University of Chicago (1067-35-962)

9:30AM   *Boundary value problems for the*
(1185)   *stationary axisymmetric Einstein*
          equations.
          Jonatan Lenells, Baylor University
          (1067-35-551)

10:00AM   *On the Loss of Regularity for the*
(1186)   *Three-Dimensional Euler Equations.*
          Claude Bardos, Laboratory J.L.Lions,
          University of Pierre and Marie Curie, and
          Edriss S Titi*, The Weizmann Institute of
          Science and The University of California -
          Irvine (1067-35-1086)

10:30AM   *On the optimality of two isoperimetrical*
(1187)   *inequalities for the p-Laplacian.*
          Ana Maria Matei, Loyola University New
          Orleans (1067-58-487)

AMS Special Session on Knots, Links, 3-Manifolds, and Physics, II

8:00 AM – 10:45 AM   **La Galerie 5,**
                                      2nd Floor, Marriott

          Organizers: **Robert Kusner**, University
                        of Massachusetts, Amherst
                        Rafal Komendarczyk,
                        Tulane University

8:00AM   *Helicity and Energy Bounds For Vector*
(1188)   *Fields.*
          Jason H Cantarella*, University of
          Georgia, and **Jason Parsley**, Wake Forest
          University (1067-57-2065)

8:30AM   *New perspectives on helicity.*
(1189)   **Jason Cantarella**, University of Georgia,
          and **Jason Parsley***, Wake Forest
          University (1067-57-2260)

9:00AM   *The Search for Higher Helicities.*
(1190)   **Clayton Shonkwiler***, Haverford College,
          Dennis DeTurck, **Herman Gluck**,
          University of Pennsylvania, **Rafal
          Komendarczyk**, Tulane University, **Paul
          Melvin**, Bryn Mawr College, and **David
          Shea Vela-Vick**, Columbia University
          (1067-57-1502)

9:30AM   *Optimally Immersed Planar Curves under*
(1191)   *Möbius Energy.*
          Ryan P Dunning, St. Mary's University
          (1067-49-937)

10:00AM   *Self-organization resulting from*
(1192)   *conservation of magnetic helicity, a*
          distributed form of linkages; applications
          to lab and solar phenomena.
          Paul M Bellan, Caltech (1067-78-1149)

AMS Special Session on Boundary Control and Moving Interface in Coupled Systems of Partial Differential Equations, II

8:00 AM – 10:50 AM   **Napoleon D3,**
                                      3rd Floor, Sheraton

          Organizers: **Lorena Bociu**, University of
                        Nebraska-Lincoln
                        Jean-Paul Zolesio,
                        CNRS-INLN and INRIA,
                        Sophia Antipolis, France

8:00AM   *Finite-dimensional attractor for a*
(1193)   *structural-acoustic system with a*
          localized feedback control.
          Daniel Y Toundykov, University of
          Nebraska-Lincoln (1067-35-852)

8:30AM   *Nonhomogeneius boundary value*
(1194)   *problems for non-stationary*
          compressible Navier-Stokes equations
          and work minimization.
          Jan Sokolowski*, Institut Elie Cartan,
          UMR 7502, and **P.I. Plotnikov**,
          Lavryentyev Institute of Hydrodynamics,
          Siberian Division of Russian Academy of
          Sciences (1067-35-1590)

9:00AM   *Morrey regularity for almost minimizers*
(1195)   *of nonconvex functionals with $p(x)$*
          growth.
          Kyle W. Fey* and **Mikil Foss**, University
          of Nebraska - Lincoln (1067-49-858)

9:30AM   *Electrical impedance tonography: From*
(1196)   *topology to shape.*
          Michael Hintermueller, University of
          Graz, Austria (1067-35-2159)

10:00AM   *Global Well-posedness for Systems*
(1197)   *of Nonlinear Wave Equations with*
          Supercritical Boundary and Interior
          Sources.
          Mohammad A. Rammaha* and **Yanqiu
          Guo**, University of Nebraska- Lincoln
          (1067-35-1041)

10:30AM   *The Optimal Interior Regularity for the*
(1198)   *Critical Case of a Clamped Thermoelastic*
          System with Point Control.
          Catherine G Lebiedzik, Wayne State
          University (1067-35-1511)

AMS Special Session on Self-Organization in Human, Biological, and Artificial Systems, I

8:00 AM – 10:50 AM **Great Ballroom E, 5th Floor, Sheraton**

Organizer: **Andrea L. Bertozzi**, University of California Los Angeles

8:00AM *Explicit results for the swarm*
(1199) *aggregation model in any dimension.*
Theodore Kolokolnikov, Dalhousie University (1067-00-1397)

8:30AM *Limiting PDEs for Social Dynamics.*
▶ (1200) Preliminary report.
Alethea Barbaro, UCLA (1067-92-655)

9:00AM *Local Well-Posedness and Blow-up*
(1201) *Results for an Aggregation Equations and Patlak-Keller-Segel Models with Degenerate Diffusion.*
Nancy Rodriguez, UCLA (1067-35-620)

9:30AM *Global existence for aggregation*
(1202) *equations and Patlak-Keller-Segel models with degenerate diffusion.*
Jacob Philip Bedrossian, University of California, Los Angeles (1067-35-1393)

10:00AM *Nonlocal PDE models for*
(1203) *self-organization of biological groups.*
Razvan C. Fetecau*, Simon Fraser University, and **Raluca Eftimie**, McMaster University (1067-35-604)

10:30AM *Characterization of radially symmetric*
(1204) *finite time blowup in multidimensional aggregation equations.*
Andrea Bertozzi, **John Garnett**, UCLA, and **Thomas Laurent***, University of California, Riverside (1067-35-606)

AMS Special Session on Harmonic Analysis and Partial Differential Equations, I

8:00 AM – 10:50 AM **Grand Couteau Room, 5th Floor, Sheraton**

Organizers: **Svitlana Mayboroda**, Purdue University

Tatiana Toro, University of Washington

8:00AM *Topics in quasi-metric geometry.*
(1205) **Irina Mitrea**, Institute for Mathematics and its Applications, University of Minnesota (1067-00-1866)

8:30AM *Sharp weighted norm inequalities for*
(1206) *classical operators.*
David V. Cruz-Uribe*, Trinity College, **José María Martell**, Instituto de Ciencias Matematicas CSIC-UAM-UC3M-UCM, and **Carlos Pérez**, Universidad de Sevilla (1067-42-2102)

9:00AM *The linear bound in A_2 characteristic for*
(1207) *Calderon-Zygmund operators.*
Michael T. Lacey, Georgia Institute of Technology (1067-42-475)

9:30AM *On Muckenhoupt-Wheeden Conjecture.*
(1208) **Maria Carmen Reguera**, Georgia Institute of Technology (1067-42-1668)

10:00AM *Geometric discrepancy and lattice*
(1209) *constructions.*
Dmitriy Bilyk, U. of South Carolina, **Xiaomin Ma**, **Jill Pipher***, Brown University, and **Craig Spencer**, Kansas State University (1067-42-1759)

10:30AM *Sobolev estimates for an FIO calculus*
(1210) *associated to marine seismic imaging.*
Raluca Felea, Rochester Institute of Technology, New York, **Allan Greenleaf**, University of Rochester, New York, and **Malabika Pramanik***, University of British Columbia, Vancouver (1067-26-1725)

AMS Special Session on Groups, Geometry, and Applications, II

8:00 AM – 10:50 AM **Borgne Room, 3rd Floor, Sheraton**

Organizer: **Delaram Kahrobaei**, City University of New York

8:00AM *Generating random braids.*
▶ (1211) **Juan Gonzalez-Meneses**, Universidad de Sevilla (1067-20-462)

8:30AM *Dehn functions and finiteness properties*
(1212) *of subgroups of CAT(0) groups.*
Noel P. Brady*, **Dan P. Guralnik** and **Sang Rae Lee**, University of Oklahoma (1067-20-1640)

9:30AM *Divergence in right-angled Artin groups.*
(1213) **Jason Behrstock**, Lehman College, CUNY, and **Ruth Charney***, Brandeis University (1067-20-1127)

10:30AM *Enumerating Primitives and Palindromes*
(1214) *in Rank Two Free Groups.*
Jane Gilman*, Rutgers University, Newark, and **Linda Keen**, Lehman College, CUNY and Graduate Center (1067-20-338)

AMS Special Session on New Topics in Graph Theory, I

8:00 AM – 10:50 AM **Grand Chenier Room, 5th Floor, Sheraton**

Organizers: **Ralucca Gera**, Naval Postgraduate School

Eunjeong Yi, Texas A&M University at Galveston

8:00AM *Functigraphs: A Generalization of*
▶ (1215) *Permutation Graphs.*
Ralucca M Gera*, Naval Postgraduate School, **Andrew Chen**, Minnesota State University Moorhead, **Daniela Ferrero**, Texas State University, San Marcos, and **Eunjeong Yi**, Texas A&M University at Galveston (1067-05-2007)

8:30AM
► (1216)
Toward a language theoretic proof of the four color theorem.
Bobbe J. Cooper, University of Minnesota, **Eric S. Rowland***, Tulane University, and **Doron Zeilberger**, Rutgers University (1067-05-84)

9:00AM
(1217)
The Independence and Annihilation Numbers.
Craig Eric Larson*, Virginia Commonwealth University, and **Ryan Pepper**, University of Houston - Downtown (1067-05-1010)

9:30AM
► (1218)
Steinberg's Conjecture on Higher Surfaces.
Carl R Yerger*, Davidson College, and **Robin Thomas**, Georgia Institute of Technology (1067-05-687)

10:00AM
► (1219)
Large 1-factorizable subgraphs.
Tyler Seacrest* and **Stephen G. Hartke**, University of Nebraska - Lincoln (1067-05-43)

10:30AM
► (1220)
On extremal graphs with a given number of perfect matchings. Preliminary report.
Stephen G Hartke, **Derrick Stolee***, University of Nebraska-Lincoln, **Douglas B West** and **Matthew Yancey**, University of Illinois Urbana-Champaign (1067-05-917)

AMS Session on Algebraic Topology and Global Analysis

8:00 AM – 10:55 AM   Southdown Room, 4th Floor, Sheraton

8:00AM
(1221)
The role of free Lie algebras in the Taylor tower of Γ-modules. Preliminary report.
Dan Lior, University of Illinois (1067-55-2325)

8:15AM
(1222)
Applications of our generalized result of C. T. C Wall´s suspension theorem.
Mokhtar Aouina, Jackson State University (1067-55-1365)

8:30AM
► (1223)
The fundamental group as topological group.
Jeremy T Brazas, University of New Hampshire (1067-55-1394)

8:45AM
(1224)
Mixed Coxeter Systems.
J Kyle Armstrong, Florida State University (1067-55-2133)

9:00AM
(1225)
The homotopy type of the complement of an arrangement of hyperplanes.
Kris J Williams, University of Iowa (1067-55-1030)

9:15AM
(1226)
A Finite Dimensional L_∞ Module.
Michael P Allocca, University of Scranton (1067-55-1664)

9:30AM
► (1227)
Asymptotics of minimal dilatation pseudo-Anosov mapping classes on rays in the gn-plane.
Aaron David Valdivia, Florida State University (1067-55-1342)

9:45AM
(1228)
Comparing Kac-Moody Groups over $\mathbb{C}$ and Finite Fields via Homotopy Theory.
John D Foley, University of California at San Diego (1067-22-2171)

10:00AM
(1229)
Bi-Lipschitz embeddability of the Grushin plane into Euclidean space.
Jeehyeon Seo, University of Illinois at Urbana Champaign (1067-58-558)

10:15AM
(1230)
String structures and loop spaces. Preliminary report.
Corbett Redden, Michigan State University (1067-58-953)

10:30AM
(1231)
A Generalization of the Fujisawa-Kuh Global Inversion Theorem. Preliminary report.
E Cabral Balreira, Trinity University (1067-58-1113)

10:45AM
(1232)
Definition of the Cycle Space of Orbits of Semi-simple Lie Groups acting on Flag Manifolds.
B. Ntatin, Austin Peay State University (1067-58-1518)

AMS Session on Mathematical Biology and Ecology, III

8:00 AM – 10:55 AM   Bayside B, 4th Floor, Sheraton

8:00AM
(1233)
The effect of co-colonization with community-acquired and hospital-acquired methicillin-resistant Staphylococcus aureus strains on competitive exclusion.
Joanna Pressley*, Vanderbilt University, **Erika M. C. D'Agata**, Beth Israel Deaconess Medical Center, and **Glenn F. Webb**, Vanderbilt University (1067-92-1388)

8:15AM
(1234)
An Optimal Control Mathematical Model for Photoreceptor Interactions.
E. T. Camacho, Arizona State University, **L. A. Melara***, Shippensburg University, **M. C. Villalobos**, The University of Texas - Pan American, and **S. Wirkus**, Arizona State University (1067-92-1814)

8:30AM
(1235)
Blood Vessel Segmentation in Volumetric Ultrasound.
Jue Wang*, Union College, and **Yongjian Yu**, InfiMed Inc. (1067-92-1810)

8:45AM
(1236)
Prelens Tear Film Evaporation from a Porous Layer.
Amber C Xu, Carnegie Mellon University (1067-92-2332)

9:00AM
► (1237)
Modeling, Analysis and Outbreak Risk of Vancomycin-Resistant Enterococci. Preliminary report.
Mohammed Yahdi*, **Sara Abdelmageed**, Ursinus College, **Jon Lowden**, California University of Pennsylvania, and **Lloyd Tannenbaum**, Ursinus College (1067-92-2381)

9:15AM ▸ (1238) *Predictions of tumor morphological stability and evaluation against experimental observations.*
Kara T Pham*, **Hermann B Frieboes**, University of California, Irvine, **Vittorio Cristini**, University of Texas, Austin, and **John Lowengrub**, University of California, Irvine (1067-92-2303)

9:30AM (1239) *Computational fluid dynamic simulation to assess flow characteristics of an in vitro aneurysm model.*
Dawn Alisha Lott*, Delaware State University, **Charles J Prestigiacomo**, University of Medicine and Dentistry of New Jersey, **Hans R Chaudhry**, War-Related Illness and Injury Center and New Jersey Institute of Technology, and **Michael Siegel**, New Jersey Institute of Technology (1067-92-748)

9:45AM ▸ (1240) *Effect of Arterial Geometry on Stresses in Intracranial Aneurysms.* Preliminary report.
Lisa Melanson, Northwestern University (1067-92-1683)

10:00AM ▸ (1241) *Model and Simulation of Red Blood Cell Dynamics in Patients with Chronic Kidney Disease.* Preliminary report.
Karen M. Bliss, North Carolina State University (1067-92-1163)

10:15AM ▸ (1242) *A Mathematical Model for Active Transport of Gag Protein in the Cytoplasm.* Preliminary report.
Roberto Munoz-Alicea, Colorado State University, Fort Collins (1067-92-365)

10:30AM (1243) *General stability analysis of a model of atherogenesis.*
L. R. Ritter*, Southern Polytechnic State University, **A. I Ibragimov**, Texas Tech University, and **J. R. Walton**, Texas A & M University (1067-92-1474)

10:45AM ▸ (1244) *A Mathematical Model of the Effects of Antioxidants on Atherosclerotic Lesion Growth.*
Hayley M Belli*, University of Oregon, **Jay R Walton** and **May Boggess**, Texas A&M University (1067-92-141)

MAA Session on New and Continuing Connections between Math and the Arts, I

8:00 AM – 10:55 AM **Rhythms I, 2nd Floor, Sheraton**

Organizer: **Douglas E. Norton**, Villanova University

8:00AM ▸ (1245) *Sequences, Series, Combinatorics, and Probability in the Early Plate Work of Jennifer Bartlett.*
Mary L Garner, Kennesaw State University (1067-S1-2302)

8:20AM ▸ (1246) *Hyperbolic Planes Take Off!*
Vi Hart, vihart.com (1067-S1-1164)

8:40AM ▸ (1247) *Tilings of hyperbolic space and their visualization.* Preliminary report.
Vladimir L Bulatov, Corvallis, OR (1067-S1-1691)

9:00AM ▸ (1248) *Glide Reflections as a Cultural and Artistic Value.* Preliminary report.
Darrah P. Chavey, Beloit College (1067-S1-2347)

9:20AM ▸ (1249) *Flash-y Pictures: Go with the Flow.* Preliminary report.
Anne Burns, Long Island University, C.W. Post Campus (1067-S1-508)

9:40AM ▸ (1250) *A Workshop in Geometric Constructions of Mosaic Designs.*
Reza Sarhangi, Towson University (1067-S1-219)

10:00AM ▸ (1251) *Islamic decorations and wallpaper groups.*
Frode Ronning, Sor-Trondelag University College (1067-S1-247)

10:20AM ▸ (1252) *Art at the Museum of Mathematics.*
George W. Hart, Museum of Mathematics (1067-S1-2228)

10:40AM ▸ (1253) *Photographic Fractal Trees.*
Robert W. Fathauer, Tessellations Company (1067-S1-1692)

MAA Session on Mathematics Experiences in Business, Industry, and Government

8:00 AM – 10:55 AM **Mardi Gras BC, 3rd Floor, Marriott**

Organizers: **Carla D. Martin**, James Madison University

Philip E. Gustafson, Mesa State College

Michael Monticino, University of North Texas

8:00AM ▸ (1254) *Bayesian Inference for Rapid Social Networking Analysis.*
Timothy D Andersen* and **C Allen Butler**, Daniel H. Wagner Associates Inc. (1067-O1-2022)

8:20AM ▸ (1255) *Updates on a New Green's Function Code for Radiation Transport.*
Candice Rockell Gerstner* and **John Tweed**, Old Dominion University (1067-O1-713)

8:40AM ▸ (1256) *Patterns in criminal offender distance decay.*
Mike P O'Leary, Towson University (1067-O1-1318)

9:00AM ▸ (1257) *The US blood supply, bioterrorism and mathematics.*
Sonja Sandberg*, Framingham State University, and **Steven Anderson**, FDA (1067-O1-2087)

9:20AM (1258) *Building Models and a Methodology for Using Technologies to Detect Suicide Bombers.*
William P. Fox*, **Michael Minutas** and **John Binstock**, Naval Postgraduate School (1067-O1-562)

9:40AM ▶ (1259) *Estimation of Black Globe Temperature for Calculation of the WBGT Index.* Preliminary report. **Vincent E Dimiceli***, Oral Roberts University, and **Steven F Piltz**, National Weather Service, Tulsa, OK (1067-O1-1401)

10:00AM ▶ (1260) *The Strategic Use of Analytics in Government Is A Powerful Resource In Achieving Federal Missions.* **Carl L Moravitz**, IBM Global Business Services, Performance Management and Analytics (1067-O1-1407)

10:20AM ▶ (1261) *Improving the performance of open-ended mathematics questions.* **James H Fife**, Educational Testing Service (1067-O1-439)

10:40AM (1262) *Math in the City: A hands-on learning experience in mathematical modeling.* **Petronela Radu*** and **Stephen Hartke**, University of Nebraska-Lincoln (1067-O1-129)

MAA Session on Fostering, Supporting, and Propagating Math Circles for Students and Teachers, II

8:00 AM – 10:55 AM   St. Jerome, 3rd Floor, JW Marriott

Organizers: **Tatiana Shubin**, San Jose State University

Elgin H. Johnston, Iowa State University

James Tanton, St. Mark's Institute of Mathematics

8:00AM ▶ (1263) *Texas A&M Summer Educational Enrichment (SEE-Math) for Middle School Students: Organization and Technology.* **Philip B Yasskin**, Texas A&M University (1067-F1-2003)

8:20AM ▶ (1264) *A Tale of Two Circles.* **Nathan A. Carlson**, California Lutheran University (1067-F1-1363)

8:40AM ▶ (1265) *Gnomons at the Teacher Circle.* **Jeffery T. McLean**, University of St. Thomas (1067-F1-973)

9:00AM Discussion.

9:20AM ▶ (1266) *Math Circles along the Hudson River: from New York City to Albany.* **Japheth Wood**, Bard College (1067-F1-2353)

9:40AM ▶ (1267) *San Francisco Math Circle (SFMC) Mathematics and Community Attitudes Survey and Evaluation Tool.* Preliminary report. **Brandy S Wiegers***, Mathematical Sciences Research Institute, and **Yuan-Juang Yvonne Lai**, University of Michigan, Ann Arbor (1067-F1-2399)

10:00AM ▶ (1268) *Yielding the Floor: Student-Driven Math Circles.* **Sam Vandervelde**, St. Lawrence University (1067-F1-1658)

10:20AM ▶ (1269) *Problem solving paradigms for mathematical research.* Preliminary report. **Ted Theodosopoulos**, Saint Ann's School (1067-F1-2188)

10:40AM ▶ (1270) *Math Circles Library.* Preliminary report. **Tatiana Shubin**, San Jose State University (1067-F1-2251)

MAA General Contributed Paper Session, VII

8:00 AM – 10:55 AM   St. Claude, 3rd Floor, JW Marriott

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

8:00AM ▶ (1271) *Paper Homework or Online Homework?* Preliminary report. **Dai Jialing**, The University of the Pacific (1067-Z1-2200)

8:15AM ▶ (1272) *Closing the Gap Between Learners' and Instructors' Expectations.* Preliminary report. **Laura J Schmidt*** and **Joy L Becker**, University of Wisconsin-Stout (1067-Z1-1353)

8:30AM (1273) *Improving College Mathematics Teaching Through Faculty Development.* **Hilary Fletcher***, **Alex Heidenberg** and **Gerald Kobylski**, United States Military Academy (1067-Z1-1551)

8:45AM ▶ (1274) *The Quill Chart: Sensitizing Faculty to End-of-Term Stresses.* **E. Lee May, Jr.**, Salisbury University (1067-Z1-319)

9:00AM (1275) *Getting Back Home: Student Meaning-Making in Linear Algebra.* **George F. Sweeney**, San Diego State University/UCSD (1067-Z1-2008)

9:15AM ▶ (1276) *An investigation of student discovery of the concept of eigenvector in the context of 2-D linear vector fields.* Preliminary report. **Robert L. Sachs**, George Mason University (1067-Z1-1642)

9:30AM ▶ (1277) *An Introductory Computational Thinking Sequence for Science Majors.* Preliminary report. **Christopher M Kuster*** and **John C Symms**, Carroll University (1067-Z1-535)

9:45AM ▶ (1278) *Assessing the Effects of Application of Cognitive Load Theory in the Teaching and Learning of Undergraduate Mathematics.* **Jerry C. Obiekwe**, The university of Akron-Wayne College (1067-Z1-644)

10:00AM ▶ (1279) *Mental Mathematics as a Game: Historical Foundations Applied to Today's Classroom.* **Elizabeth C. Rogers***, **A Poole James** and **Elizabeth L. Poole**, Piedmont College (1067-Z1-2418)

10:15AM ► (1280) *Can Mathematics Be Taught? Revisiting Carl Linderholm's "Mathematics Made Difficult".* **John C Mayer**, University of Alabama at Birmingham (1067-Z1-1371)

10:30AM ► (1281) *Explorations that enhance student understanding of limits and derivatives.* **Ken M Collins**, Charlotte Latin School (1067-Z1-401)

10:45AM ► (1282) *Redesign of Calculus 2.* Preliminary report. **Kyle Riley**, South Dakota School of Mines & Technology (1067-Z1-1893)

MAA General Contributed Paper Session, VIII

8:00 AM – 10:55 AM   Orleans, 3rd Floor, JW Marriott

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

8:00AM (1283) *Using Steiner designs to construct entanglement-assisted quantum error-correcting codes.* **David Clark**, Michigan Technological University (1067-Z1-1635)

8:15AM ► (1284) *Cryptology with Mathematica.* Preliminary report. **Thawda Aung**, Randolph College (1067-Z1-2187)

8:30AM ► (1285) *Simulating a Verbal Translation of the Navajo Code; a Completed Version.* Preliminary report. **Rick E. Klima***, Appalachian State University, and **Neil P. Sigmon**, Radford University (1067-Z1-648)

8:45AM ► (1286) *Braid group cryptography and some related computational problems.* **Imre Tuba***, San Diego State University, Imperial Valley, and **Jonathan Boiser**, University of California, Merced (1067-Z1-2402)

9:00AM (1287) *An Infinite Collection of Quasi-Isometrically Distinct Graph Braid Groups.* **Praphat Xavier Fernandes**, Emory University (1067-Z1-1508)

9:15AM ► (1288) *Families of proofs that the prime numbers are infinite.* Preliminary report. **J Marshall Ash*** and **T. Kyle Petersen**, DePaul University (1067-Z1-862)

9:30AM ► (1289) *Some Prime Curiosities.* Preliminary report. **Jay L. Schiffman**, Rowan University (1067-Z1-46)

9:45AM ► (1290) *Permutations and Ladders.* **Jennifer Franko Vasquez*** and **Steven T. Dougherty**, The University of Scranton (1067-Z1-2090)

10:00AM (1291) *Patterns for Permutations with Fixed Points.* **Amy Mihnea**, Florida Atlantic University (1067-Z1-1807)

10:15AM ► (1292) *Palindromic Curiosities.* Preliminary report. **G. Joseph Wimbish**, Daytona State College (1067-Z1-69)

10:30AM (1293) *Introduction to Abstract Algebra Based on Computational Algebra with Applications Drawn from Biology.* **Kapila Rohan Attele***, **Dan Hrozencik** and **Victor Akatsa**, Chicago State University (1067-Z1-1073)

10:45AM ► (1294) *Interpolation and remainders: two formulas that are really the same.* **Ezra A. Brown**, Virginia Tech (1067-Z1-482)

AWM Hay Minisymposium

8:00 AM – 11:00 AM   La Galerie 1, 2nd Floor, Marriott

Organizers: **Cathy Kessel**, Education Consultant

W. James Lewis, University of Nebraska-Lincoln

8:00AM ► (1295) *Mathematics, Educational Research, and STEM Education Policy: Challenges and Opportunities in the Intersection.* **Joan Ferrini-Mundy**, National Science Foundation and Michigan State University (1067-97-2203)

8:30AM ► (1296) *Addressing Challenges in the Common Core: Mathematics Specialists in Elementary and Middle Schools.* Preliminary report. **Patricia F Campbell**, University of Maryland (1067-97-1622)

9:00AM ► (1297) *The Role of Logic in the K-12 Mathematics Curriculum.* **Susanna S Epp**, DePaul University (1067-97-2152)

9:30AM ► (1298) *The Power of Interdisciplinary Bridges: Throwing the Net Widely.* **Deborah Hughes Hallett**, University of Arizona/Harvard Kennedy School (1067-97-1237)

10:00AM *Panel Discussion: The Mathematical Education of Teachers and the Common Core.*

PME Council Meeting

8:00 AM – 11:00 AM   Audubon Room, 5th Floor, Marriott

Employment Center

8:00 AM – 7:00 PM   Preservation Hall, 2nd Floor, Marriott

AMS Session on General Topology

8:30 AM – 10:55 AM   Napoleon D1, 3rd Floor, Sheraton

8:30AM *The period set of a map from the Cantor*
(1299) *set to itself.*
James Cannon, Brigham Young University, **Mark Meilstrup***, University of Leoben, and **Andreas Zastrow**, University of Gdansk (1067-37-1881)

8:45AM *Inversible Fibrations.* Preliminary report.
(1300) **Nigar Tuncer**, Okan University (1067-54-1895)

9:00AM *The Uniform Box Product Problem.*
(1301) **Scott W Williams*** and **Jocelyn R Bell**, SUNY at Buffalo (1067-54-760)

9:15AM *Normality of Uniform Box Products.*
(1302) **Jocelyn R Bell**, SUNY at Buffalo (1067-54-982)

9:30AM *A Generalization of Scattered spaces.*
(1303) **Mehrdad Namdari**, Shahid Chamran University (1067-54-1854)

9:45AM *Extensions of Tychonoff theorem in*
(1304) *Hausdorff compactifications and generalized Stone-Weierstrass theorem.*
Hueytzen J Wu*, Texas A & M University - Kingsville, and **Wan-Hong Wu**, UT Health Science Center - San Antonio, Texas (1067-54-574)

10:00AM *The Number of Minimal Left and Minimal*
(1305) *Right Ideals in βS.* Preliminary report.
Neil Hindman, Howard University, Washington, DC, **Lakeshia R. Legette***, Johnson C. Smith University, and **Dona Strauss**, University of Leeds (1067-54-823)

10:15AM *On nonseparable Erdős type spaces.*
(1306) **Jan J. Dijkstra**, Vrije Universiteit Amsterdam, and **Kirsten I. S. Valkenburg***, University of Saskatchewan (1067-54-901)

10:30AM *The Topological Structure of the Unit*
(1307) *Octonions and the Quantum Theory of Games.*
Aden O Ahmed, Texas A&M University - Kingsville (1067-54-1385)

10:45AM *The Advent of Point-Set Topology.*
▶ (1308) Preliminary report.
Nick Scoville, Ursinus College (1067-54-598)

AMS Session on History of Mathematics

8:30 AM – 10:40 AM   Cornet Room, 8th Floor, Sheraton

8:30AM *Relative Accuracy of Quadrilateral Area*
▶ (1309) *Measurement in the Ancient World.*
Preliminary report.
Erik R. Tou, Carthage College (1067-01-1344)

8:45AM *Mathematician's Trio.* Preliminary report.
▶ (1310) **M. Moazzam**, Salisbury University (1067-01-918)

9:00AM *The mathematics of Al-Biruni.*
▶ (1311) **Morteza Seddighin**, Indiana University East (1067-01-1109)

9:15AM *Early American Presidents' Mathematical*
▶ (1312) *Interests.*
Andrew B Perry, Springfield College (MA) (1067-01-1366)

9:30AM *Examples of Early 1900 Mathematics*
(1313) *Secondary Mathematics.*
Matthew J Haines, Augsburg College, MN (1067-01-1857)

9:45AM *Euler's Rettung: Euler's anonymous work*
▶ (1314) *on the limits of mathematics, science, and faith.*
Dominic W Klyve, Central Washington University (1067-01-1471)

10:00AM *Euler's proof that every prime of the*
▶ (1315) *form $4n + 1$ is sum of two squares.*
Paul R. Bialek, Trinity International University (1067-01-2392)

10:15AM *Neither Positive nor Negative nor yet Null*
(1316) *numbers: Analogy in William Rowan Hamilton's Argument for imaginary numbers.*
Maritza M. Branker*, Niagara University, and **Joseph J. Little**, Department of English, Niagara University (1067-01-26)

10:30AM *Felix Hausdorff: Mathematician, Poet,*
▶ (1317) *and Playwright.* Preliminary report.
Charlotte K. Simmons* and **Jesse W. Byrne**, University of Central Oklahoma (1067-01-2343)

SIAM Minisymposium on Education

8:30 AM – 10:55 AM   Bayside A, 4th Floor, Sheraton

Organizer: **Peter Turner**, Clarkson University

8:30AM *Applied Mathematics and High School*
▶ (1318) *Outreach: Opportunities and Resources.*
Peter R Turner, Clarkson University (1067-97-1001)

9:00AM *Outreach Activities in Mathematical*
▶ (1319) *Biology.*
Suzanne Lenhart*, University of Tennessee, and **Sarah Duncan**, University of Alabama (1067-92-1140)

9:30AM *Math Modeling for Middle School*
▶ (1320) *Students.*
Katie R Fowler* and **Aaron Luttman**, Clarkson University (1067-97-1278)

10:00AM *Using Disease Models to Develop*
(1321) *Teacher's Understanding of Modeling.*
Tracie McLemore Salinas* and **Rene A. Salinas**, Appalachian State University (1067-92-2056)

10:30AM *Math Modeling for high school students:*
▶ (1322) *Moody's Mega Math Challenge as educational outreach.*
Michelle J Montgomery, SIAM (1067-97-1548)

AMS-MAA Graduate Student Fair

8:30 AM – 10:30 AM   Napoleon A1-A3,
                                  3rd Floor, Sheraton

Undergrads! Take this opportunity to meet representatives from mathematical science graduate programs.

MAA Retiring Presidential Address

9:00 AM – 9:50 AM   Great Ballroom
                                A-C, 5th Floor, Sheraton

(1323)   *Issues of the transition to college mathematics.*
         David M. Bressoud, Macalester College
         (1067-A0-36)

ASL Invited Address

9:00 AM – 9:50 AM   Bayside C, 4th Floor, Sheraton

(1324)   *Final coalgebras: A survey.*
         Larry Moss, Indiana University
         (1067-03-64)

MAA Invited Paper Session on Fish Tales: Stories from Mathematical Fluid Dynamics

9:00 AM – 10:50 AM   Rhythms II and
                                III, 2nd Floor, Sheraton

        Organizer: **Katherine Socha**, St. Mary's
                     College of Maryland
 9:00AM *Langmuir Layers: Exploring a (nearly)*
► (1325) *Two-dimensional Fluid Experiment.*
         Andrew J. Bernoff, Harvey Mudd College
         (1067-AE-1602)
 9:30AM *An economical micro-submarine testbed*
► (1326) *for validation of 3D cooperative control strategies for underwater robots.*
         Rachel Levy* and **Students from DYNAR Research Group**, Harvey Mudd College (1067-AE-1672)
10:00AM *How jellyfish can inspire mathematics: A*
 (1327) *case study of the feeding currents generated by upside-down jellyfish.*
         Laura A Miller*, **Christina Hamlet**, University of North Carolina at Chapel Hill, and **Arvind Santhanakrishnan**, Georgia Institute of Technology (1067-AE-1022)
10:30AM *Hydrodynamics and pattern formation.*
 (1328) Preliminary report.
         Keith Mertens, UNC Chapel Hill
         (1067-AE-2417)

MAA Minicourse #4: Part B

9:00 AM – 11:00 AM   IIe de France I,
                                 3rd Floor, JW Marriott

        Getting students involved in undergraduate research.
        Organizers: **Aparna W. Higgins**,
                    University of Dayton

Joseph A. Gallian,
University of
Minnesota-Duluth

MAA Minicourse #7: Part B

9:00 AM – 11:00 AM   IIe de France III,
                                 3rd Floor, JW Marriott

        The mathematics of Islam and its use in the teaching of mathematics.
        Organizer: **Victor J. Katz**, University of
                     the District of Columbia

MAA Minicourse: #8: Part B

9:00 AM – 11:00 AM   IIe de France II,
                                 3rd Floor, JW Marriott

        The ubiquitous Catalan numbers and their applications.
        Organizer: **Thomas Koshy**,
                     Framingham State University

MAA Panel Discussion

9:00 AM – 10:20 AM   La Galerie 6,
                                 2nd Floor, Marriott

        Utilizing NSF ADVANCE to promote the success of women faculty in mathematics.
        Organizer: **Jenna Carpenter**, Louisiana
                     Tech University
        Panelists: **Judith Silver**, Marshall
                     University
                     Brooke Shipley, University
                     of Illinois at Chicago
                     Brenda Johnson, Union
                     College
                     Jenna Carpenter

MAA Panel Discussion

9:00 AM – 10:20 AM   La Galerie 2,
                                 2nd Floor, Marriott

        The benefits of hosting a regional undergraduate mathematics conference
        Organizers: **Doug Faires**, Youngstown
                    State University
                    Doug Faires
        Panelists: **Kendra Kilpatrick**,
                     Pepperdine University
                     Laura Taalman, James
                     Madison University
                     Nathan Gibson, Oregon
                     State University

Student Hospitality Center

9:00 AM – 5:00 PM   Gallier Room,
                                4th Floor, Sheraton

Exhibits and Book Sales

9:30 AM – 5:30 PM   **Grand Ballroom,
3rd Floor, Marriott**

ASL Invited Address

10:00 AM – 10:50 AM   **Bayside C,
4th Floor, Sheraton**

  (1329)   *Independence results in the model theory
of infinitary logics.*
Monica VanDieren, Robert Morris
University (1067-03-68)

AWM Hay Minisymposium Panel Discussion

10:00 AM – 11:00 AM   **La Galerie 1,
2nd Floor, Marriott**

  *The mathematical education of teachers
and the common core.*
Moderator: **W. James Lewis**, University
of Nebraska-Lincoln
Panelists: **Phyllis Chinn**, Humboldt
State University

     Harriet Pollatsek, Mount
Holyoke College

     Annie Selden, New Mexico
State University

     Martha Smith, University of
Texas at Austin

AMS Invited Address

10:05 AM – 10:55 AM   **Great Ballroom
A-C, 5th Floor, Sheraton**

  (1330)   *Modular forms and the topology of
certain hyperbolic 3-manifolds.*
Akshay Venkatesh, Stanford University
(1067-11-11)

AMS-MAA Invited Address

11:10 AM – NOON   **Great Ballroom A-C,
5th Floor, Sheraton**

  (1331)   *The Riemann zeta-function and related
L-functions: A progress report.*
Kannan Soundararajan, Stanford
University

MAA Lecture for Students

1:00 PM – 2:30 PM   **Mardi Gras EFGH,
3rd Floor, Marriott**

▶ (1332)   *Turning theorems into plays.*
Steve Abbott, Middlebury College
(1067-A0-34)

2:00PM   Come and meet the speaker in the
Student Hospitality Lounge, Gallier
Room, 4th Floor, Sheraton.

AMS Current Events Bulletin

1:00 PM – 4:45 PM   **Mardi Gras D,
3rd Floor, Marriott**

  Organizer: **David Eisenbud**, University
of California, Berkeley

1:00PM
(1333)   *Khot's Unique Games Conjecture: its
consequences and the evidence for and
against.*
Luca Trevisan, Stanford (1067-68-1706)

2:00PM
(1334)   *Counting special points: logic,
Diophantine geometry and
transcendence theory.*
Thomas Warren Scanlon, University of
California, Berkeley (1067-03-2144)

3:00PM
(1335)   *Spaces of graphs and surfaces - On the
work of Soren Galatius.*
Ulrike Tillmann, Oxford University
(1067-57-2406)

4:00PM
(1336)   *The Geometric Nature of the
Fundamental Lemma.*
David E Nadler, Northwestern
(1067-22-434)

AMS-AWM Special Session on Hopf Algebras and Their Representations, II

1:00 PM – 5:50 PM   **Nottoway Room,
4th Floor, Sheraton**

  Organizers: **M. Susan Montgomery**,
University of Southern
California

     Siu-Hung Ng, Iowa State
University

     Sarah J. Witherspoon,
Texas A&M University

1:00PM
(1337)   *A Freeness Result Revisited.* Preliminary
report.
David E. Radford, U. of Illinios at
Chicago (1067-16-1849)

1:30PM
▶ (1338)   *Hopf algebras of small dimension.*
Preliminary report.
Margaret Beattie, Mount Allison
University (1067-16-1322)

2:00PM
(1339)   *The Central Charge of Factorizable Hopf
Algebras coming from Bilinear Forms.*
Preliminary report.
Yorck Sommerhaeuser, University of
South Alabama (1067-16-2184)

2:30PM
(1340)   *A q-identity related to a comodule.*
Andrea Jedwab* and **Susan
Montgomery**, University of Southern
California (1067-16-1064)

3:00PM
(1341)   *The Lie product in the continuous Lie
dual of the Witt algebra.*
Earl J. Taft*, Rutgers University, and
Zhifeng Hao, South China University of
Technology (1067-17-212)

3:30PM
(1342)   *Indicators for the Drinfel'd doubles of
certain groups.*
Marc Keilberg, University of California
San Diego (1067-16-1876)

4:00PM (1343) *Drinfeld centers of graded fusion categories.* **Shlomo Gelaki**, Technion-Israel Institute of Technology, **Deepak Naidu***, Texas A&M University, and **Dmitri Nikshych**, University of New Hampshire (1067-00-465)

▶ 4:30PM (1344) *Fusion categories of dimension pq^2.* **David A Jordan***, Massachusetts Institute of Technology, and **Eric Larson**, Harvard University (1067-18-1455)

5:00PM (1345) *Cocycle deformations, calculus, and extensions.* **Mitja Mastnak**, Saint Mary's University (1067-16-1258)

5:30PM (1346) *Hopf algebraic approach to Picard-Vessiot theory.* Preliminary report. **Akira Masuoka**, University of Tsukuba (1067-16-891)

AMS Special Session on Stochastic Analysis and Mathematical Physics: A Session in Honor of the 80th Birthday of Len Gross, II

1:00 PM – 5:50 PM   **Balcony N, 4th Floor, Marriott**

Organizers: **Bruce K. Driver**, University of California at San Diego
Maria Gordina, University of Connecticut
Todd Kemp, Massachusetts Institute of Technology and University of California at San Diego

1:00PM (1347) *Boundary conditions for the Ricci flow.* **Artem Pulemotov**, The University of Chicago (1067-53-765)

1:30PM (1348) *Smoothness of Density for the Area Process of Fractional Brownian Motion.* Preliminary report. **Patrick R Driscoll**, University of California, San Diego (1067-60-1573)

2:00PM (1349) *Hypoelliptic heat kernel inequalities on H-type groups.* **Nathaniel Eldredge**, Cornell University (1067-58-1425)

2:30PM (1350) *Dimension-independent results on heat kernels.* Preliminary report. **Brian C. Hall*** and **Matt Cecil**, University of Notre Dame (1067-46-1049)

3:00PM (1351) *From Dimension-independent Heat Kernel Estimates to Exceptional Sets.* Preliminary report. **Matthew Cecil*** and **Brian Hall**, University of Notre Dame (1067-46-1604)

3:30PM (1352) *Heat kernel measures on a class of infinite dimensional Lie groups.* **Tai Melcher**, University of Virginia (1067-60-1587)

4:00PM (1353) *Restriction principles in Segal-Bargmann analysis associated to a Coxeter group.* **Stephen Bruce Sontz**, CIMAT, Guanajuato, Mexico (1067-81-707)

4:30PM (1354) *Bargmann–Segal space, generalized functions and Feynman–Kac formula.* Preliminary report. **Martin Grothaus**, University of Kaiserslautern (1067-46-736)

5:00PM (1355) *The L^p norm of the Segal-Bargmann Transform.* **William E Gryc***, Muhlenberg College, and **Todd Kemp**, University of California, San Diego (1067-44-340)

5:30PM (1356) *A stochastic integral for adapted and instantly independent stochastic processes.* **Hui-Hsiung Kuo***, **Anuwat Sae-Tang** and **Benedykt Szozda**, Louisiana State University (1067-60-890)

AMS Special Session on Lie Algebras, Algebraic Groups, and Related Topics, II

1:00 PM – 5:50 PM   **Napoleon D3, 3rd Floor, Sheraton**

Organizers: **Audrey L. Malagon**, Mercer University
Julie C. Beier, Mercer University
Daniel K. Nakano, University of Georgia

1:00PM (1357) *Cohomology of Finite Groups of Lie Type and Kostant's Partition Functions.* Preliminary report. **Cornelius Pillen**, University of South Alabama (1067-20-1326)

1:30PM (1358) *On geometric realizations of quantum groups.* **Yiqiang Li**, Virginia Tech. (1067-16-2321)

2:00PM (1359) *The image of a root system in a Coxeter plane.* **Skip Garibaldi**, Emory University (1067-20-983)

2:30PM (1360) *Affine structures for certain E_6 crystals.* **Brant Jones***, James Madison University, and **Anne Schilling**, University of California, Davis (1067-22-1450)

3:00PM (1361) *Triality and Arason invariant for algebras with involution.* Preliminary report. **Anne Quéguiner-Mathieu***, UPEC - Universite Paris 13, and **Jean-Pierre Tignol**, Université Catholique de Louvain (1067-16-1325)

3:30PM (1362) *On cohomology and support varieties for Lie superalgebras.* **Irfan Bagci**, University of California, Riverside (1067-17-452)

4:00PM (1363) *Centroids of Jordan Superalgebras over Superscalars.* Preliminary report. **Pamela A Richardson***, Westminster College, and **Jennifer Bowen**, The College of Wooster (1067-17-995)

4:30PM (1364) *Zero Cycles on Principal Homogeneous Spaces over Fields of Virtual Cohomological Dimension at most 2.* **Jodi A. Black**, Emory University (1067-11-958)

5:00PM (1365) *Irreducible finite-dimensional representations of equivariant map algebras.* **Prasad Senesi***, Catholic University of America, **Erhard Neher** and **Alistair Savage**, University of Ottawa (1067-17-2014)

5:30PM (1366) *Some results on stability for algebraic groups.* **Brian Parshall**, University of Virginia (1067-20-1403)

AMS Special Session on Completely Integrable Systems, Random Matrices, and the Bispectral Problem, II

1:00 PM – 5:50 PM   Rosalie, 3rd Floor, JW Marriott

Organizers: **Bojko Bakalov**, North Carolina State University
Michael Gekhtman, University of Notre Dame
Plamen Iliev, Georgia Institute of Technology
Milen T. Yakimov, Louisiana State University

1:00PM (1367) *Discrete integrability in recursion relations for (q)-characters and fusion coefficients.* Preliminary report. **Philippe Di Francesco**, CEA/Saclay, France, and **Rinat Kedem***, University of Illinois Urbana-Champaign (1067-17-1715)

1:30PM (1368) *Representations of quantum toroidal* $gl(1)$. **Evgeny Mukhin**, IUPUI (1067-81-2099)

2:00PM (1369) *The charged free boson integrable hierarchy.* **Katie T Liszewski**, North Carolina State University (1067-37-1608)

2:30PM (1370) *Intersections of Schubert cells and orbits of real semisimple Lie groups on the flag variety.* **Sam Evens**, University of Notre Dame (1067-22-1247)

3:00PM (1371) *Double Lie bialagebra structure on Lie superalgebras.* **Ivan Dimitrov***, Queen's University, Kingston, Canada, and **Milen Yakimov**, Louisiana State University, Baton Rouge, USA (1067-17-1865)

3:30PM (1372) *The Modular Class of Poisson Submersion.* Preliminary report. **Arlo Caine*** and **Sam Evens**, University of Notre Dame (1067-53-2114)

4:00PM (1373) *Bicharacter construction for boson-fermion correspondences.* Preliminary report. **Iana I Anguelova**, College of Charleston (1067-81-1173)

4:30PM (1374) *Methods for constructing matrix-valued bispectral operators.* **Joel B. Geiger*** and **Milen T. Yakimov**, Louisiana State University (1067-33-1861)

5:00PM (1375) *Reflexive and projective D-modules.* Preliminary report. **Greg Muller***, Louisiana State University, and **Yuri Berest**, Cornell University (1067-16-1381)

5:30PM (1376) *A nonlinear Gelfand-Zeitlin integrable system on the Poisson dual Lie group* $GL(n, \mathbb{C})^*$. **Mark Colarusso***, Université de Laval, and **Sam Evens**, University of Notre Dame (1067-22-1498)

AMS Special Session on New Trends in Theory and Applications of Evolution Equations

1:00 PM – 5:50 PM   Conde, 3rd Floor, JW Marriott

Organizers: **Guoping Zhang**, Morgan State University
Gaston N'Guerekata, Morgan State University
Wen-Xie Ma, University of South Florida
Yi Li, University of Iowa

1:00PM (1377) *Existence of Pseudo Almost Automorphic Solutions to Some Second-Order Partial Evolution Equations.* Preliminary report. **Toka Diagana**, Howard University (1067-34-20)

1:30PM (1378) *Systems of Nonlinear Schrödinger Equations.* **Mihaela Manole**, Department of Applied Mathematics, Babes Bolyai University, Cluj-Napoca, Romania (1067-47-53)

2:00PM (1379) *Exact Discretization of Linearized Euler Equations in One Space Dimension.* **Ronald E. Mickens**, Clark Atlanta University (1067-35-75)

2:30PM (1380) *Local existence of strong solutions for semilinear wave equation with source and damping type interactions.* **Petronela Radu**, University of Nebraska-Lincoln (1067-35-83)

3:00PM (1381) *Multi-peak Solutions to Two Types of Free Boundary Problems.* **Yi Li***, University of Iowa and Xian Jiaotong University, and **Shuangjie Peng**, Central China Normal University (1067-35-1983)

3:30PM (1382) *Quantitative Approximation by Fractional Smooth Poisson Cauchy Singular Operators.* Preliminary report. **George A. Anastassiou** and **Razvan A. Mezei***, University of Memphis (1067-35-121)

4:00PM (1383) *Norm inflation for incompressible magneto-hydrodynamic system in $\dot{B}_\infty^{-1,\infty}$.* **Mimi Dai***, **Jie Qing** and **Maria Schonbek**, University of California, Santa Cruz (1067-35-466)

4:30PM (1384) *A quenching problem due to a concentrated nonlinear source in an infinite strip.* **Patcharin Tragoonsirisak**, Fort Valley State University (1067-35-638)

5:00PM (1385) *Mathematical Methods for Modeling of Lightning and Thunderstorm Electrification.* **Beyza C. Aslan***, University of North Florida, and **William Hager**, University of Florida (1067-86-1669)

5:30PM (1386) *Optimal Control of Fractional Diffusion Equation.* **Gisèle Mophou**, Université des Antilles et de la Guyane (1067-49-1643)

AMS Special Session on von Neumann Algebras

1:00 PM – 5:45 PM   Frontenac, 3rd Floor, JW Marriott

Organizers: **Richard D. Burstein**, Vanderbilt University
Remus Nicoara, University of Tennessee, Knoxville

1:00PM (1387) *Subfactors and Planar Algebras.* Preliminary report. **Dietmar Bisch**, Vanderbilt University (1067-46-1477)

2:00PM (1388) *Eliminating vines and weeds in the classification of subfactors to index 5.* **David Penneys**, UC Berkeley (1067-46-701)

3:00PM (1389) *Applications of multiple operator integration.* **Anna Skripka***, University of Central Florida, **Denis Potapov** and **Fedor Sukochev**, University of New South Wales (1067-47-653)

4:00PM (1390) *Orlicz spaces over real von Neumann Algebras.* Preliminary report. **Genady Grabarnik**, St. Johns University (1067-47-2425)

5:00PM (1391) *A Morita theorem for dual operator algebras.* **Upasana Kashyap**, The Citadel (1067-46-1496)

AMS Special Session on Local Commutative Algebra

1:00 PM – 5:50 PM   Napoleon D2, 3rd Floor, Sheraton

Organizers: **Paul C. Roberts**, University of Utah
Anurag K. Singh, University of Utah

Sandra M. Spiroff, University of Mississippi

1:00PM ► (1392) *Relating Initial Degrees of Symbolic and Regular Powers.* Preliminary report. **Susan Marie Cooper*** and **Stephen G Hartke**, University of Nebraska–Lincoln (1067-13-1765)

1:30PM (1393) *Equality of Powers and Symbolic Powers of Ideals.* **Aline Hosry**, University of Missouri, **Young Su Kim**, Purdue University, and **Javid Validashti***, University of Kansas (1067-13-1087)

2:00PM (1394) *Lifting Splittings and the Strong Direct Summand Conjecture.* **Jason McCullough**, University of California, Riverside (1067-13-856)

2:30PM (1395) *Krull Schmidt Property for Ideals of Reduced Commutative Noetherian Rings.* **Basak Ay**, The Ohio State University at Lima (1067-13-455)

3:00PM (1396) *Brauer-Thrall theorems and conjectures for commutative local rings.* **Roger A Wiegand**, University of Nebraska (1067-13-1294)

3:30PM (1397) *Matlis Duals of Ext-Modules.* Preliminary report. **Bethany Ann Kubik***, **Sean Sather-Wagstaff**, North Dakota State University, and **Micah J Leamer**, University of Nebraska-Lincoln (1067-13-1152)

4:00PM ► (1398) *Torsion of Cohomology Modules.* **Julian David Chan**, University of Utah (1067-13-942)

4:30PM (1399) *F-signature of pairs.* **Manuel Blickle**, Johannes Gutenberg-Universität Mainz, **Karl Schwede***, Penn State University, and **Kevin Tucker**, University of Utah (1067-13-1281)

5:00PM (1400) *Asymptotic linearity of regularity and a*-invariant of powers of ideals.* **Tai Ha**, Tulane University (1067-13-1177)

5:30PM (1401) *Prime ideals in birational extensions of power series rings.* Preliminary report. **Christina Eubanks-Turner**, University of Louisiana at Lafayette, **Melissa Luckas**, Madison, Wisconsin, **A. Serpil Saydam**, University of Louisiana at Monroe, and **Sylvia M Wiegand***, University of Nebraska Lincoln (1067-13-1971)

AMS Special Session on Dirac Operators

1:00 PM – 5:50 PM   Borgne Room, 3rd Floor, Sheraton

Organizers: **Craig A. Nolder**, Florida State University
John Ryan, University of Arkansas

1:00PM (1402) *Multicomplex Spaces: Holomorphicity and Dolbeault Complexes.*
Mihaela B Vajiac*, **Daniele C Struppa** and **Adrian I Vajiac**, Chapman University (1067-32-2098)

1:30PM (1403) *The Hypercomplex Beurling-Ahlfors Transform.*
Craig A. Nolder, Florida State University (1067-30-269)

2:00PM (1404) *Generalized Cauchy-Pompeiu and Bochner-Martinelli-Koppelman Integral Representation Formulas.* Preliminary report.
Mircea Martin, Baker University (1067-35-1089)

2:30PM (1405) *Split Quaternionic Analysis and Representation Theory.*
Matvei Libine, Indiana University (1067-20-994)

3:00PM (1406) *The Infinite Dirac Operator.*
Thomas J. Bieske*, University of South Florida, and **John Ryan**, University of Arkansas (1067-35-1679)

3:30PM (1407) *Some Rarita-Schwinger type operators.*
Junxia Li*, **John Ryan**, University of Arkansas, and **Peter Van Lanker**, University College of Gent (1067-43-715)

4:00PM (1408) *On Dirac type operators.*
John Ryan, University of Arkansas (1067-30-1367)

4:30PM (1409) *An equivalent condition to the existence of an irreducible Seiberg-Witten Monopole on a smooth closed 4-manifold.*
Celso Melchiades Doria, Federal University of Santa Catarina (1067-58-241)

5:00PM (1410) *Dirac operator and K-theory for discrete groups.*
Paul Frank Baum, Penn State University (1067-19-257)

5:30PM (1411) *Complex N-Spin Bordism of Semifree Circle Actions and Elliptic Genera.*
Muhammad N. Ahmad, Kansas State University (1067-55-1437)

AMS Special Session on Set-Valued Optimization and Variational Problems

1:00 PM – 5:50 PM Maurepas, 3rd Floor, JW Marriott

Organizers: **Akhtar A. Khan**, Rochester Institute of Technology
Miguel Sama, Universidad Nacional de Educacion a Distancia, Madrid

1:00PM (1412) *Set-valued optimization revisited: From minimal points to lattice solutions.*
Andreas H Hamel, Yeshiva University New York (1067-49-2127)

1:30PM (1413) *Variational Analysis of Minimal Time Functions and Applications.*
Nguyen Mau Nam* and **Juan Salinas**, University of Texas-Pan American (1067-49-681)

2:00PM (1414) *Hybrid systems for variational inequalities.*
Monica Gabriela Cojocaru, University of Guelph (1067-49-2316)

2:30PM (1415) *Lagrange necessary conditions for Pareto minimizers in Asplund spaces and applications.*
Bao Quang Truong*, Northern Michigan University, and **Christiane Tammer**, Martin-Luther-University Halle-Wittenberg (1067-90-554)

3:00PM (1416) *A simple proof of Fredholm alternative for A-proper mappings.*
Dan D. Pascali, Courant Institute, New York University (1067-47-1515)

3:30PM (1417) *Second Order Necessary Conditions for Problems with Locally Lipschitz Data via Tangential Directions.*
Elena Constantin, University of Pittsburgh at Johnstown (1067-49-1132)

4:00PM (1418) *A new topological condition for the existence of lagrange multipliers in set-valued optimization.*
Miguel Sama*, Universidad Nacional de Educación a Distancia, and **Akhtar A. Khan**, Rochester Institute of Technology (1067-49-1386)

▶ 4:30PM (1419) *A Generalized Newton's Method based on Graphical Derivatives.*
Hung Phan, Wayne State University (1067-49-775)

5:00PM (1420) *Discrete Approximations and Optimality Conditions for the Sweeping Process.*
Hoang Dinh Nguyen, Wayne State University (1067-49-773)

5:30PM (1421) *Toward Second-Order Sensitivity Analysis in Set-Valued Optimization.*
Akhtar A Khan*, Rochester Institute of Technology, and **D E Ward**, Miami University (1067-49-1382)

AMS Special Session on Knot Theory, I

1:00 PM – 5:50 PM La Galerie 5, 2nd Floor, Marriott

Organizers: **Tim D. Cochran**, Rice University
Shelley Harvey, Rice University

1:00PM (1422) *Examples of the head and the tail of the colored Jones polynomial.* Preliminary report.
Oliver Dasbach, Louisiana State University (1067-57-783)

1:30PM (1423) *Walks along Braids and the Colored Jones Polynomial.* Preliminary report.
Cody Armond, Louisiana State University (1067-57-763)

2:00PM (1424) *On Legendrian Graphs.* Preliminary report.
Danielle O'Donnol and **Elena Pavelescu***, Rice University (1067-57-857)

2:30PM *The (n)-Solvable Filtration of the Link*
(1425) *Concordance Group and Milnor's*
        Invariants.
        Carolyn A Otto, Rice University
        (1067-54-788)

3:00PM *The knot Floer complex, cabling and*
(1426) *concordance.* Preliminary report.
        Jennifer Hom, University of Pennsylvania
        (1067-57-629)

3:30PM *Genetic infection by string links and new*
(1427) *structure of the knot concordance group.*
        Preliminary report.
        John R. Burke, Wesleyan University
        (1067-57-383)

4:00PM *Invariants of spatial graphs.*
(1428) **Danielle S. O'Donnol**, Rice University
        (1067-57-865)

4:30PM *Concordance within a fixed homotopy*
(1429) *class.*
        Prudence Heck, Rice University
        (1067-57-835)

5:00PM *Filtering smooth concordance classes of*
(1430) *topologically slice knots.* Preliminary
        report.
        Tim D Cochran, **Shelly Harvey**, Rice
        University, and **Peter D Horn***, Columbia
        University (1067-57-497)

5:30PM *Legendrian contact homology in Seifert*
(1431) *fibered spaces.*
        Joan E Licata*, Stanford University, and
        Joshua M. Sabloff, Haverford College
        (1067-57-675)

AMS Special Session on Self-Organization in Human, Biological, and Artificial Systems, II

1:00 PM – 4:50 PM   Great Ballroom
                              E, 5th Floor, Sheraton

        Organizer: **Andrea L. Bertozzi**,
                     University of California Los
                     Angeles

1:00PM *Graphs, Dynamical Systems, Fractals: A*
▶ (1432) *Heuristic Framework For Modeling the*
        Structure and Dynamics of Complex
        Interactions Across Multiple Levels of
        Analysis. Preliminary report.
        Richard E Niemeyer, University of
        California, Riverside (1067-91-2247)

1:30PM *An Agent-Based Approach to Modeling*
▶ (1433) *Gang Rivalries.* Preliminary report.
        Laura M. Smith, University of California,
        Los Angeles (1067-91-235)

2:00PM *Point process modeling and estimation of*
(1434) *near-repeat effects in crime data.*
        George O Mohler, Santa Clara University
        (1067-62-581)

2:30PM *Self-Exciting Point Process Models of*
(1435) *Civilian Deaths in Iraq.*
        Erik Lewis*, UCLA, **George Mohler**,
        Santa Clara University, **P. Jeffrey
        Brantingham** and **Andrea Bertozzi**,
        UCLA (1067-60-339)

3:00PM *Asymptotic dynamics of*
(1436) *attractive-repulsive swarms.*
        Chad M. Topaz*, Macalester College,
        and **Andrew J. Bernoff**, Harvey Mudd
        College (1067-92-317)

3:30PM *A Primer of Swarm Equilibria.*
(1437) **Andrew J. Bernoff***, Harvey Mudd
        College, and **Chad M. Topaz**, Macalester
        College (1067-35-320)

4:00PM *Generalized Birkhoff-Rott equation for 2D*
(1438) *active scalar problems.*
        Hui Sun*, **Uminsky David** and **Bertozzi
        Andrea**, University of California, Los
        Angeles (1067-76-1077)

4:30PM *A theory of complex patterns arising*
(1439) *from 2D particle interactions.*
        David T. Uminsky*, UCLA, **Theodore
        Kolokolnikov**, Dalhousie University, **Hui
        Sun** and **Andrea Bertozzi**, UCLA
        (1067-70-1042)

AMS Special Session on Harmonic Analysis and Partial Differential Equations, II

1:00 PM – 5:50 PM   Grand Couteau
                              Room, 5th Floor, Sheraton

        Organizers: **Svitlana Mayboroda**,
                     Purdue University

                     Tatiana Toro, University of
                     Washington

1:00PM *Harmonic analysis and uniform*
(1440) *rectifiability.*
        Steven C. Hofmann, University of
        Missouri (1067-42-799)

1:30PM C^α *and* BMO *solvability of Dirichlet*
(1441) *problem for divergence form elliptic*
        equations with complex L^∞ *coefficients.*
        Mihalis Mourgoglou, University of
        Missouri-Columbia (1067-35-1729)

2:00PM *Elliptic PDE and Carleson-measure*
(1442) *estimates.*
        Ariel Elizabeth Barton, Purdue
        University (1067-35-1224)

2:30PM *Homogenization of Neumann Boundary*
(1443) *Value Problems.* Preliminary report.
        Zhongwei Shen, University of Kentucky
        (1067-35-523)

3:00PM *Regularity and Free Boundary Regularity*
(1444) *for the p-Laplace Operator in Reifenberg*
        Flat and NTA Ahlfors Regular Domains.
        Preliminary report.
        John L Lewis, University of Kentucky
        (1067-35-686)

3:30PM *Free boundary regularity for harmonic*
(1445) *measure from two sides.*
        Matthew Badger, University of
        Washington (1067-31-1108)

4:00PM *Estimates for the dimension of*
(1446) p*-harmonic measure in* $\mathbb{R}^n$. Preliminary
        report.
        Björn Bennewitz, Iceland, **John L Lewis**,
        University of Kentucky, **Kaj Nyström**,
        Umea University, and **Andrew L Vogel***,
        Syracuse University (1067-35-1543)

4:30PM *Asymptotics of positive harmonic*
(1447) *functions on paraboloid-type regions.*
Koushik Ramachandran*, Purdue
University,West Lafayette, IN, **Alexandre
Eremenko** and **Svitlana Mayboroda**,
Purdue University (1067-31-2013)

5:00PM *Estimates for a family of multi-linear*
(1448) *forms.*
Zhongyi Nie and **Russell M. Brown***,
University of Kentucky (1067-35-1793)

5:30PM *Convergence of Eigenvalues for Elliptic*
(1449) *Systems on Perturbed Domains with Low
Regularity.*
Justin L Taylor, University of Kentucky
Mathematics Department (1067-35-1607)

AMS Special Session on Difference Equations and Applications

1:00 PM – 5:50 PM   **Maurepas Room,
                                 3rd Floor, Sheraton**

Organizer: **Michael A. Radin**, Rochester
             Institute of Technology

1:00PM *Open Problems and Conjectures in*
(1450) *Difference Equations.* Preliminary report.
Gerasimos E. Ladas, University of Rhode
Island (1067-39-211)

1:30PM *Global Attractivity of Equilibria and*
(1451) *Existence of Prime Period-Two Solutions
for a Class of Planar Systems of
Difference Equations.*
Sukanya Basu, Midwestern State
University (1067-39-627)

2:00PM *Long-Term Behavior of Solutions*
(1452) *of the Difference Equation*
$x_{n+1} = x_{n-1}x_{n-2} - 1.$
Candace M. Kent*, Virginia
Commonwealth University, **Witold
Kosmala**, Appalachian State University,
and **Stevo Stevic**, Mathematical Institute
of the Serbian Academy of Sciences
(1067-39-1375)

2:30PM *Uncovering fundamental properties of*
(1453) *difference equations by semiconjugate
factorization.*
H Sedaghat, Virginia Commonwealth
University (1067-39-988)

3:00PM *Global Behavior of Certain*
(1454) *Nonautonomous Nonlinear Discrete
Population Models Exhibiting Allee Effect.*
Preliminary report.
Vlajko L Kocic, Xavier University of
Louisiana (1067-39-484)

3:30PM *On the periodically forced Simoid*
(1455) *Beverton-Holt Model.* Preliminary report.
Y Kostrov, Xavier University of Louisiana
(1067-39-2066)

4:00PM *Computing recurrences for Mellin-Barnes*
▶ (1456) *integrals.*
Flavia Stan, Tulane University
(1067-39-997)

4:30PM *Algebraic Extensions for Summation in*
(1457) *Finite Terms.*
Burcin Erocal, Research Institute for
Symbolic Computation (RISC), Linz,
Austria (1067-40-674)

5:00PM *Boundary value problems for singular*
(1458) *elliptic equations.*
Loc Hoang Nguyen* and **Klaus Schmitt**,
University of Utah (1067-35-414)

5:30PM *Right focal boundary value problems for*
(1459) *difference equations.*
Johnny Henderson, Baylor University
(1067-39-18)

AMS Special Session on New Topics in Graph Theory, II

1:00 PM – 5:50 PM   **Grand Chenier
                                 Room, 5th Floor, Sheraton**

Organizers: **Ralucca Gera**, Naval
            Postgraduate School
            Eunjeong Yi, Texas A&M
            University at Galveston

1:00PM *Two Theorems on Four Colorings.*
▶ (1460) **Ping Zhang**, Western Michigan University
(1067-05-1293)

1:30PM *On Hamiltonian-Colored Graphs.*
▶ (1461) **Kyle Kolasinski**, Western Michigan
University (1067-05-1340)

2:00PM *On Neighbor-Distinguishing Edge*
▶ (1462) *Colorings.*
Ryan C Jones, Western Michigan
University (1067-05-1338)

2:30PM *The G-Shi arrangement, and its relation*
(1463) *to G-parking functions.*
Art Duval*, University of Texas at El
Paso, **Caroline Klivans**, University of
Chicago, and **Jeremy Martin**, University
of Kansas (1067-05-963)

3:00PM *A Matrix Theory Approach to Planar*
(1464) *Graphs.*
Jason J Molitierno, Sacred Heart
University (1067-15-559)

3:30PM *Iteration index of a zero forcing set in a*
▶ (1465) *graph.* Preliminary report.
Kiran Chilakamarri, Texas Southern
University, **Nathaniel Dean**, Texas State
University, **Cong X Kang*** and **Eunjeong
Yi**, Texas A&M University at Galveston
(1067-05-1157)

4:00PM *Common Divisor Graphs of Permutation*
(1466) *Groups and IP-graphs of Association
Schemes.*
Bangteng Xu, Eastern Kentucky
University (1067-05-29)

4:30PM *Two new Graph factorization problems.*
▶ (1467) Preliminary report.
Dinesh Sarvate*, College of Charleston,
V. Murali, Rhodes University, and
Hau Chan, Stony Brook University
(1067-05-421)

5:00PM *Screen Size.*
▶ (1468) **Nathaniel Dean**, Texas State
University-San Marcos (1067-05-1553)

5:30PM *Chemical Sub-Structural Cluster*
▶ (1469) *Expansions.*
Douglas J. Klein, Texas A&M University
at Galveston (1067-05-1762)

AMS Session on Ordinary Differential Equations

1:00 PM – 5:55 PM   **Southdown Room,**
       4th Floor, Sheraton

1:00PM *Preliminary Investigation on the*
(1470) *Properties of the "Leah"-Cosine and -Sine*
Functions†.
Joshua Mann*, **Anthony Scrouse**,
Morehouse College, and **Ronald E.
Mickens**, Clark Atlanta University
(1067-34-92)

1:15PM *Stepanov-like almost automorphy for*
(1471) *stochastic processes and applications to*
stochastic differential equations.
Gaston M. N'Guerekata, Morgan State
University (1067-34-1637)

1:30PM *Asymptote of orbits of a planar*
(1472) *polynomial vector field with the fixed*
Newton polygon.
Faina Berezovskaya, Howard University
(1067-34-1550)

1:45PM *Boundary Points of $P_{n,m}$.* Preliminary
(1473) report.
G. Edgar Parker, James Madison
University (1067-34-1586)

2:00PM *Cauchy-Kowalevski and Polynomial ODE.*
▶ (1474) **Roger Thelwell*** and **Paul Warne**, James
Madison University (1067-34-1932)

2:15PM *Asymptotic Behavior for Systems of*
▶ (1475) *Nonlinear Differential Equations.*
Elizabeth Catsimanes, University of
Central Missouri (1067-34-2250)

2:30PM *On Ordinary Differential Equations with*
(1476) *Discontinuous Right Sides.* Preliminary
report.
Zhivko S. Athanassov, Bulgarian
Academy of Sciences (1067-34-2412)

2:45PM *Perturbation Analysis of Slow Waves for*
(1477) *Periodic Differential-Algebraic Systems of*
Definite Type. Preliminary report.
Aaron T. Welters, University of
California, Irvine (1067-34-2262)

3:00PM *The existence of Multiple solutions for a*
▶ (1478) *fourth order nonhomogeneous boundary*
value problem.
Britney Hopkins, University of Central
Oklahoma (1067-34-915)

3:15PM *Comparison of Smallest Eigenvalues.*
(1479) **Jeffrey T Neugebauer**, Baylor University
(1067-34-555)

3:30PM *Nonlocal boundary value problems for*
(1480) *nth order differential equations by*
solution matching.
Xueyan Sherry Liu, Baylor University
(1067-34-437)

3:45PM *Global Attractivity of Periodic Solutions*
(1481) *of First Order Delay Differential*
Equations with Applications in Population
Dynamics.
Seshadev Padhi*, Birla Institute of
Technology, Mesra, Ranchi, **Julio G Dix**,
Texas State University at San Marcos, and
Smita Pati, Birla Institute of Technology
(1067-34-2383)

4:00PM *Existence and Characterization Theorems*
(1482) *for Fuzzy Differential Equations.*
Barnabas Bede, University of Texas- Pan
American (1067-34-1654)

4:15PM *An Approximate Method for Obtaining a*
▶ (1483) *Polynomial Solution to the Problem of the*
Unsteady Velocity-Time History of Flow
Startup in a Duct.
William S. Janna* and **Karyn M Bautista**,
University of Memphis (1067-34-1964)

4:30PM *Weak Allee effect, grazing, and S-shaped*
▶ (1484) *bifurcation curves.*
Brittany C Stephenson*, Mississippi
State University, **Emily K Poole**,
University of Arkansas, and **Bonnie J
Roberson**, Mississippi State University
(1067-34-424)

4:45PM *Interactions of the CAN and NaP currents*
(1485) *yield a novel bursting pattern in a model*
for a respiratory neuron.
Justin R. Dunmyre*, University of
Pittsburgh, **Christopher A. Del Negro**,
College of William and Mary, and
Jonathan E. Rubin, University of
Pittsburgh (1067-34-2230)

5:00PM *Economic Analysis of the Use of*
▶ (1486) *Facemasks During Pandemic (H1N1)*
2009.
Samantha M. Tracht*, Los Alamos
National Laboratory & University of
Tennessee - Knoxville, **Sara Y. Del Valle**
and **Brian Edwards**, Los Alamos National
Laboratory (1067-34-1663)

5:15PM *Dynamics of the SAIQR Influenza Model.*
(1487) **Ana Luz Vivas**, New Mexico State
University (1067-34-919)

5:30PM *Models of Antibody responses during HIV*
▶ (1488) *viral infections.*
Stanca M. Ciupe*, University of Louisiana
at Lafayette, **Patrick DeLeenheer**,
University of Florida, and **Thomas
Kepler**, Duke University Medical Center
(1067-34-1260)

5:45PM *HIV-1 Model with latently infected cells*
▶ (1489) *and optimal drug treatment strategy.*
Preliminary report.
Maria Leite*, The University of
Oklahoma, **Barbara Benitez-Gucciardi**,
Houston Baptist University, **Suzanne
Lenhart**, University of Tennessee,
and **Libin Rong**, Oakland University
and Center for Biomedical Research
(1067-34-287)

AMS Session on Number Theory, III

1:00 PM – 5:10 PM
Napoleon D1,
3rd Floor, Sheraton

1:00PM ▶ (1490) *Rational self-maps on projective space with automorphisms.* Preliminary report. **Benjamin Hutz***, CUNY Graduate Center, and **Michelle Manes**, University of Hawaii (1067-11-665)

1:15PM (1491) *Congruences Between Spaces of Cuspidal Modular Forms.* **Randy J Heaton**, Florida State University (1067-11-2028)

1:30PM (1492) *Modular forms with non-negative Fourier coefficients and extremal lattices.* **Paul Jenkins**, Brigham Young University, and **Jeremy Rouse***, Wake Forest University (1067-11-1462)

1:45PM (1493) *The representation theory of GSp(4).* **Jeffery E. Breeding**, University of Oklahoma (1067-11-442)

2:00PM (1494) *Differential equations for cubic theta functions.* **Tim Huber**, University of Texas-Pan American (1067-11-1836)

2:15PM ▶ (1495) *A proof of Ewell's Octuple Product Identity.* Preliminary report. **Zhu Cao**, University of Mississippi, and **Xinyun Zhu***, University of Texas of Permian Basin (1067-11-1131)

2:30PM (1496) *The Connection Between Germain Primes and Twin Primes.* **Thomas J Wright**, Lawrence University (1067-11-1883)

2:45PM (1497) *Infinite class of new sign ambiguities.* **Heon Kim**, Southern University at New Orleans (1067-11-1603)

3:00PM (1498) *An Improved Method for Computing Group Homology of the Congruence Subgroup $\Gamma_0(2)$ of $SL_3(\mathbb{Z})$.* **Becky E Hall**, Western Connecticut State University (1067-11-284)

3:15PM (1499) *Minimal Polynomials of Singular Moduli.* Preliminary report. **Eric Errthum**, Winona State University (1067-11-1255)

3:30PM (1500) *The Simplest Cubic Function Fields.* Preliminary report. **Jonathan Webster***, Bates College, and **Pieter Rozenhart**, INRIA Bordeaux Sud-Ouest (1067-11-734)

3:45PM (1501) *Using the p-Group Generation Algorithm to Determine Extensions of D_4 by $C_2 \times C_2 \times C_{2^n}$.* Preliminary report. **Aliza A Steurer**, Dominican University (1067-11-128)

4:00PM (1502) *Norm-Euclidean Galois cubic fields.* **Kevin J. McGown**, Oregon State University (1067-11-111)

4:15PM (1503) *The Ramification Group Filtrations of Elementary Abelian Extensions and Beyond.* Preliminary report. **Qingquan Wu**, Texas A&M International University (1067-11-1060)

4:30PM (1504) *The Dwork Family and Hypergeometric Functions.* **Adriana Salerno**, Bates College (1067-11-1621)

4:45PM ▶ (1505) *The classification of curves $G(X) = H(Y)$ with infinitely many rational points.* Preliminary report. **Benjamin L Weiss**, University of Michigan (1067-11-1779)

5:00PM ▶ (1506) *Another look at the GHS Attack on the Elliptic Curve Discrete Logarithm Problem.* **Matthew Musson**, University of Calgary (1067-11-1694)

AMS Session on Mathematical Biology and Ecology, IV

1:00 PM – 5:55 PM
Bayside B, 4th Floor, Sheraton

1:00PM ▶ (1507) *Mathematical models for the effect of transmission-blocking vaccines on malaria.* **Gabriel T Davis***, Carleton College, **Jay Walton** and **May Boggess**, Texas A&M University (1067-92-163)

1:15PM ▶ (1508) *An Optimal Treatment Strategy for Malaria Infection.* Preliminary report. **Jeremy J. Thibodeaux***, Loyola University New Orleans, and **Timothy Schlittenhardt**, University of Central Oklahoma (1067-92-1021)

1:30PM ▶ (1509) *Sensitivity Analysis Of a Cholera Epidemic Model.* Preliminary report. **Boloye Gomero**, University of Tennessee, Knoxville, TN (1067-92-2264)

1:45PM ▶ (1510) *A Stochastic Model of Rotavirus Infection and Vaccination.* Preliminary report. **Erica Johnson**, **Jennifer Ortiz** and **Omayra Ortega***, Arizona State University (1067-92-2336)

2:00PM ▶ (1511) *Transmission Dynamics of Kala-azar in Bihar and Impact on Public Health Policies.* Preliminary report. **Anuj Mubayi**, Department of Infectious Disease, Cleveland Clinic (1067-92-1063)

2:15PM ▶ (1512) *Get the News Out Loudly and Quickly: Modeling the Influence of the Media on Limiting Infectious Disease Outbreaks.* Preliminary report. **Anna Mummert***, Marshall University, and **Thembinkosi Mkhatshwa**, Oklahoma State University (1067-92-1105)

2:30PM ▶ (1513) *Coexistence of competitors in deterministic and stochastic patchy environments.* **Zhilan Feng**, Purdue University, **Ronsong Liu**, Dept. of Mathematics and Dept. of Zoology and Physiology, University of Wyoming, **Zhipeng Qiu**, Nanjing University of Science and Technology, **Joaquin Rivera***, Colgate University, and **Abdul-Aziz Yakubu**, Howard University (1067-92-752)

2:45PM (1514) *Mathematical theory of selection and the Principle of minimum discrimination information.*
Georgiy P Karev, Lockheed Martin MSD, National Institute of Health (1067-92-1183)

3:00PM (1515) *A Discrete Stage-Structured Two Species Competition Model.*
Pei Zhang* and **Azmy S. Ackleh**, University of Louisiana at Lafayette (1067-92-1369)

3:15PM (1516) *Predator-prey role reversal as bifurcation in a structured model.* Preliminary report.
Christopher Brown, California Lutheran University, and **Sheila K. Miller***, United States Military Academy (1067-92-2370)

3:30PM (1517) *Stochastic juvelie-adult models with application to a green tree frog population.*
Qihua Huang*, **Azmy S. Ackleh** and **Keng Deng**, University of Louisiana at Lafayette (1067-92-1970)

3:45PM (1518) *Mathematical Model of Methamphetamine and HIV Epidemics among Men-Seeking-Men Community.* Preliminary report.
Aprillya Lanz, Virginia Military Institute (1067-92-2375)

4:00PM (1519) *A Modeling Study of Synaptic Neurotransmission and Independent Signaling of NMDA Receptors.* Preliminary report.
Justin S Blackwell, University of Texas at Arlington (1067-92-1933)

4:15PM (1520) *Using matrix analysis to model the spread of an invasive plant, Alternanthera philoxeroides.* Preliminary report.
Samantha H Erwin and **Aron J Huckaba***, Murray State University (1067-92-1426)

4:30PM (1521) *Modeling the Effects of Cannibalistic Behavior in Zebra Mussel* Dreissena polymorpha *Populations.*
Patrick Thomas Davis*, Eastern Michigan University, **May Boggess** and **Jay Walton**, Texas A&M University (1067-92-142)

4:45PM (1522) *Quantifying the effects of low dissolved oxygen on the growth, reproduction, and survival of fish.*
Rachael L. Miller Neilan*, **Kenneth Rose**, **Sean Creekmore**, Louisiana State University, **Kevin Craig**, Florida State University, and **Peter Thomas**, University of Texas (1067-92-1230)

5:00PM (1523) *Modeling Energetic and Theoretical Costs of Thermoregulatory Strategy.*
John G. Alford*, Sam Houston State University, and **William I. Lutterschmidt**, Department of Biological Sciences, Sam Houston State University (1067-92-541)

5:15PM (1524) *Disease Dynamics in Honeybee Populations.* Preliminary report.
Amalie McKee, Case Western Reserve University and Santa Fe Institute (1067-92-179)

5:30PM (1525) *Asymptotic Herbiovery and Optimal Resource Allocation: A Cause for Masting.*
George M. Shakan*, Worcester Polytechnic Institute, **Molly S. Eickholt**, Ohio Northern University, **Laurel A. Ohm**, St. Olaf College, **Kallyn K. Buschkamp**, Briar Cliff University, and **Alyssa G. Kent**, Lewis and Clark College (1067-92-1556)

5:45PM (1526) *Modeling Particle Dynamics around Choanoflagellates by the Regularized Stokeslets.* Preliminary report.
Yicong Yong*, University of Florida, and **Xingzhou Yang**, Mississippi State University (1067-92-802)

AMS Session on Topics in Mathematics

1:00 PM – 3:10 PM   Cornet Room, 8th Floor, Sheraton

1:00PM (1527) *The (l,m)-step competition number of a graph.*
Kim A.S. Factor, Marquette University, **Sarah K. Merz***, University of the Pacific, and **Yoshio Sano**, Pohang Mathematics Institute (1067-05-1373)

1:15PM (1528) *An A-invariant subspace for taut distance-regular graphs.* Preliminary report.
Mark MacLean*, Seattle University, and **Paul Terwilliger**, University of Wisconsin-Madison (1067-05-787)

1:30PM (1529) *Symbolic dynamics from partitions with overlapping elements.* Preliminary report.
David S. Richeson*, Dickinson College, **Jim Wiseman**, Agnes Scott College, and **Fabio Drucker**, Dickinson College (1067-37-1576)

1:45PM (1530) *Killing's equations for invariant metrics on Lie groups.*
Firas Y Hindeleh*, Grand Valley State University, and **Gerard Thompson**, The University of Toledo (1067-22-666)

2:00PM (1531) *An introduction to the Kirby Calculator.* Preliminary report.
Frank J Swenton, Middlebury College (1067-57-325)

2:15PM (1532) *Efficiency of Maximum Partial Likelihood Estimators with Nested Case Control Sampling and Comparisons to Maximum Likelihood Estimators.* Preliminary report.
Justin W Hansen, University of Vermont, and **Haimeng Zhang***, Mississippi State University (1067-62-1714)

2:30PM (1533) *Sharp Bounds for Multivariate Coherent Risk Measures.*
Li Zhu* and **Haijun Li**, Washington State University (1067-60-1194)

2:45PM *Poisson Approximation of the Poisson*
(1534) *Lindley Didtribution.*
Mehdi Razzaghi, Bloomsburg University
of Pennsylvania (1067-60-829)

3:00PM *Expressions with pi and the lemniscate*
(1535) *constant expanded as infinite products*
and continued fractions.
Thomas J. Osler, Rowan University
(1067-40-1193)

MAA Session on Developmental Mathematics Education: Helping Under-Prepared Students Transition to College-Level Mathematics

1:00 PM – 5:35 PM   St. Jerome, 3rd
                        Floor, JW Marriott

Organizers: **Kimberly J. Presser**,
            Shippensburg University
            J. Winston Crawley,
            Shippensburg University

1:00PM *The Effectiveness of Intensive Workshops*
▶ (1536) *in Developmental Mathematics.*
Michael B. Scott* and **Alysia Walther**,
Cal State Monterey Bay (1067-D1-2217)

1:20PM *Improving the Transition from High*
(1537) *School to College Mathematics.*
Kathryn T Ernie*, **Erick B Hofacker**,
University of Wisconsin - River Falls, and
Sherrie Serros, University of Wisconsin -
Eau Claire (1067-D1-2023)

1:40PM *Accelerated WARM UPS: Doing more with*
(1538) *less time used differently. Remedial*
Arithmetic in as Little as 20 hours.
G Michael Guy, Queensborough
Community College, CUNY
(1067-D1-1938)

2:00PM *Remedial Math and the Non-Traditional*
▶ (1539) *Learner (A Proposed Course Design).*
Darcel Ford, Strayer University
(1067-D1-1859)

2:20PM *Using Arithmetic of Integers as a Bridge*
▶ (1540) *to Arithmetic of Polynomials.*
J Bradford Burkman, Louisiana School
for Math, Science, and the Arts
(1067-D1-1811)

2:40PM *Teaching Developmental Mathematics in*
(1541) *Urban University.*
Zhixiong Chen, New Jersey City
University (1067-D1-435)

3:00PM *Supporting the high school to highly*
(1542) *demanding university transition for ESL*
learners in an environment of strong
ethnic and cultural diversity: The case of
Carnegie Mellon University in Qatar.
Dale J Winter, Carnegie Mellon University
(1067-D1-1629)

3:20PM *Leaving the Text Behind and Bringing*
▶ (1543) *Real-World Major Based Activities in to*
the Intermediate Algebra Course on a
Weekly Basis. Preliminary report.
Gary W. Hagerty, Boise State University
(1067-D1-1704)

3:40PM *Mentoring At-Risk Students in a Remedial*
▶ (1544) *Mathematics Course.*
Leonid Khazanov* and **Fred Peskoff**,
Borough of Manhattan Community
College/CUNY (1067-D1-1052)

4:00PM *Modularized Math Remediation:*
(1545) *Completely Overhauling the Broken*
System.
Aaron Wong, Nevada State College
(1067-D1-504)

4:20PM *Can Inquiry-Based Learning Augment*
▶ (1546) *Computer-Assisted Instruction in*
Developmental Algebra?
William O. Bond* and **John C. Mayer**,
University of Alabama at Birmingham
(1067-D1-1578)

4:40PM *Tracking and Ability Grouping:*
▶ (1547) *Alternative srategies for serving a*
growing population of students needing
developmental mathematics education.
Preliminary report.
Kimberly J Presser, Shippensburg
University (1067-D1-768)

5:00PM *On the Teaching of the Three Methods for*
▶ (1548) *Solving a Linear Inequality in Two*
Variables. Preliminary report.
Shumei C. Richman, Columbia, SC
(1067-D1-255)

5:20PM *The Mathematical Fitness Center: An*
(1549) *Alternative Program for Salvaging*
Mathematically Suppressed Students and
Pre-students, STEM and Otherwise.
Preliminary report.
Clyde L. Greeno, The MALEI Mathematics
Institute (1067-D1-2100)

MAA Session on Humanistic Mathematics, I

1:00 PM – 6:00 PM   Mardi Gras BC,
                        3rd Floor, Marriott

Organizers: **Gizem Karaali**, Pomona
            College
            Mark Huber, Claremont
            McKenna College
            Dagan Karp, Harvey Mudd
            College

1:00PM *Poetry in Sanskrit Mathematics.*
(1550) **Toke L Knudsen**, SUNY Oneonta
(1067-I1-1678)

1:20PM *Jesse Douglas, Norman Levinson, and*
▶ (1551) *anti-semitism at MIT in the 1930's.*
Reuben Hersh, University of New Mexico
(1067-I1-371)

1:40PM *Habits of Creative Mathematicians.*
▶ (1552) Preliminary report.
Marc Chamberland, Grinnell College
(1067-I1-1406)

2:00PM *Making the Connection: Ethnic and*
▶ (1553) *Cultural Effects of Mathematics.*
Esther M Pearson, Lasell College
(1067-I1-22)

2:20PM ▶ (1554) *Humanism, Realism, and Folk Mathematics: the Case of Reticular Geometry.* **Gregory L McColm**, University of South Florida (1067-I1-619)

2:40PM (1555) *Tales from the Underground: Polish Mathematics during World War II.* **Emelie A Kenney**, Siena College (1067-I1-86)

3:00PM ▶ (1556) *Treatment of and trouble with zero in three centuries of American arithmetic.* **Deepak Basyal**, New Mexico State University (1067-I1-1279)

3:20PM ▶ (1557) *"Beauty is Truth, Truth Beauty": The Aesthetics of Mathematical Arguments.* Preliminary report. **Andrew J. Miller**, Belmont University (1067-I1-2348)

3:40PM ▶ (1558) *Physical Math for Elementary Teachers: Reconnecting Mathematics with the Body Using Mirror Neurons.* **Susan L. Addington***, California State University, San Bernardino, and **David Dennis**, San Bernardino, CA (1067-I1-2318)

4:00PM ▶ (1559) *A Simulation of Evolutionary Psychology Using the Psychology of Personal Constructs.* Preliminary report. **Andrew G. Borden**, Palo Alto College, San Antonio, Texas (1067-I1-451)

4:20PM ▶ (1560) *Mathematics and Equity, Past and Present, through the Lives and Work of Women Mathematicians.* **Jacqueline M Dewar***, **Lily Khadjavi** and **Alissa Crans**, Loyola Marymount University (1067-I1-368)

4:40PM ▶ (1561) *Exploring Mathematical Characters, in Fact and in Fiction.* **Mike Pinter**, Belmont University (1067-I1-1283)

5:00PM *Poetry reading.*

MAA Session on Philosophy of Mathematics in Teaching and Learning

1:00 PM – 5:25 PM   Rhythms I, 2nd Floor, Sheraton

Organizers: **Dan Sloughter**, Furman University

Martin E. Flashman, Humboldt State University

1:00PM ▶ (1562) *Square Roots: Adding Philosophical Contexts and Issues to Enhance Understanding.* Preliminary report. **Martin E. Flashman**, Humboldt State University (1067-T1-1395)

1:30PM ▶ (1563) *Precalculus from an Ontological Perspective.* Preliminary report. **Whitney Johnson***, University of Maryland, College Park, and **Bill Rosenthal**, LaGuardia Community College, CUNY (1067-T1-2224)

2:00PM ▶ (1564) *Putting Content into a Fictionalist Account of Mathematics for Non-Mathematicians.* Preliminary report. **Thomas Drucker**, University of Wisconsin–Whitewater (1067-T1-1766)

2:30PM ▶ (1565) *On the Value of Doubt and Discomfort.* **Sheila K. Miller**, United States Military Academy, West Point (1067-T1-2223)

3:00PM ▶ (1566) *Mathematical Understanding and Philosophies of Mathematics.* Preliminary report. **Jeff Buechner**, Rutgers University-Newark and Saul Kripke Center, CUNY Graduate Center (1067-T1-712)

3:30PM (1567) *Abstraction and objectivity in mathematics.* **Ruggero Ferro**, University of Verona, Italy (1067-T1-1527)

4:00PM ▶ (1568) *Causation and Explanation in Mathematics.* **James R. Henderson**, University of Pittsburgh at Titusville (1067-T1-159)

4:30PM ▶ (1569) *Claims Become Theorems, but Who Decides?* Preliminary report. **Andy D. Martin**, Kentucky State University (1067-T1-2327)

5:00PM ▶ (1570) *Definitions in Their Developmental Stages: What should we call them?* Preliminary report. **Firooz Khosraviyani***, Texas A&M International University, **Terutake Abe**, South Texas College, and **Juan J Arellano**, Texas A&M International University (1067-T1-2300)

MAA General Contributed Paper Session, X

1:00 PM – 5:10 PM   Orleans, 3rd Floor, JW Marriott

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

1:00PM ▶ (1571) *Exploring Game Theory with SAGE, the open-source competitor to Maple, Mathematica, Matlab and MAGMA.* **Gregory V. Bard**, Fordham University (1067-Z1-1891)

1:15PM (1572) *Game Theory and School Choice.* **Alexander A Azzam***, University of Nebraska - Lincoln, and **Gizem Karaali**, Pomona College (1067-Z1-2143)

1:30PM ▶ (1573) *ACCUV College Football Ranking Model.* **William W Miles***, **Lisa O Coulter**, Stetson University, and **Gary Fowks**, Valencia Community College (1067-Z1-503)

1:45PM ▶ (1574) *Economic-Based Affirmative Action in College Admissions.* **Bryan Nankervis**, Texas State University-San Marcos (1067-Z1-1943)

2:00PM ▶ (1575) *Video Game Design=Mathematics.* **Paul Raymond Bouthellier**, University of Pittsburgh-Titusville (1067-Z1-327)

2:15PM ► (1576) *Application of a chaotic map to digital images.*
Mohamed Allali, Chapman University (1067-Z1-1661)

2:30PM (1577) *Perfecting Solar Greenhouse Design for Hudson Valley Winter Agriculture.*
Abigail L. Stevens* and **Gidon Eshel**, Bard College (1067-Z1-2243)

2:45PM ► (1578) *A Model for Damage to Buried Segmented Pipe.* Preliminary report.
Rachel R Roe-Dale*, Skidmore College, and **Michael O'Rourke**, Rensselaer Polytechnic Institute (1067-Z1-2166)

3:00PM (1579) *Detecting Symmetry in Coupled Droplet Oscillations.*
David M. Slater*, Cornell University, and **Paul H Steen**, Department of Chemical and Biomolecular Engineering / Cornell University (1067-Z1-2074)

3:15PM ► (1580) *Drying Droplets of Colloidal Suspensions: Role of Rheology.* Preliminary report.
Kara L. Maki*, Institute for Mathematics and its Applications, and **Satish Kumar**, University of Minnesota (1067-Z1-1985)

3:30PM (1581) *A Turbulence Model for Ideal Fluids: Analytical and Numerical Results.*
Adam Larios*, University of California, Irvine, and **Edriss S Titi**, University of California, Irvine and Weizmann Institute of Science (1067-Z1-2401)

3:45PM (1582) *Immersed elastic structure dynamics in viscoelastic fluids.*
John C. Chrispell* and **Lisa J. Fauci**, Tulane University (1067-Z1-837)

4:00PM ► (1583) *An Improved Model for Predicting Beta-Cell Insulin Secretion Rate from C-Peptide Data.*
William J Heuett*, Marymount University, **Bernard V Miller** and **Vipul Periwal**, National Institutes of Health (1067-Z1-2071)

4:15PM (1584) *A Multiscale Gene Regulation Model: Mutual Inhibition Network in Epidermal Development.*
Yuyu Peng, University of California, Irvine (1067-Z1-2293)

4:30PM (1585) *Thin Film Evolution over a Thin porous Layer: Modeling a Tear Film on a Contact Lens.*
Kumnit Nong* and **Daniel M Anderson**, George Mason University (1067-Z1-1828)

4:45PM (1586) *Modeling almond pollination by two interacting bee species with cross- and self-diffusion.*
Kamuela E Yong*, **Yi Li** and **Stephen Hendrix**, University of Iowa (1067-Z1-2018)

5:00PM ► (1587) *Singularity of Cubic Bézier Curves and Surfaces.*
Edmond Nadler*, Eastern Michigan University, **Tae-wan Kim**, **Min-jae Oh** and **Sung-ha Park**, Seoul National University (1067-Z1-2054)

MAA *General Contributed Paper Session, IX*

1:00 PM – 5:55 PM
St. Claude, 3rd Floor, JW Marriott

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

1:00PM ► (1588) *The war on apathy in a terminal statistics course: Motivating definitions from day one.* Preliminary report.
Gregory M Johnson*, Carnegie Mellon University, and **Christopher S Shaw**, Columbia College Chicago (1067-Z1-1898)

1:15PM ► (1589) *Developing A Successful Actuarial Study Group Without Having A Program In Actuarial Science.*
Chris Lacke, Rowan University (1067-Z1-1897)

1:30PM ► (1590) *Using Data-Mining to Classify Student Behaviors.* Preliminary report.
Rachel B Manspeaker, Kansas State University (1067-Z1-2113)

1:45PM ► (1591) *Using Online Survey Tools to Consolidate Game Outcomes.*
Jan O. Case, Jacksonville State University (1067-Z1-590)

2:00PM ► (1592) *Conditional probability via topics in social justice.* Preliminary report.
Julie A. Belock, Salem State University (1067-Z1-1834)

2:15PM (1593) *Stochastic dynamical model of social conflict and cooperation.*
Salam Md. Mahbubush Khan, Alabama A&M University (1067-Z1-1128)

2:30PM (1594) *Character Estimates, and Random Walks on $SU(n)$.*
Corey M Manack, University of Montana-Western (1067-Z1-657)

2:45PM (1595) *Optimal and Efficient Crossover Designs for Test-Control Study When Subject Effects are Random.*
Samad Hedayat and **Wei Zheng***, University of Illinois at Chicago (1067-Z1-1864)

3:00PM ► (1596) *Puttering Around with Golf Statistics.* Preliminary report.
Roland Minton, Roanoke College (1067-Z1-1321)

3:15PM ► (1597) *Estimation of Mode Using Auxiliary Information.*
Stephen A Sedory* and **Sarjinder Singh**, Texas A&M University-Kingsville (1067-Z1-1577)

3:30PM (1598) *Combinations of "combinations of p-values".*
Lan Cheng*, SUNY Fredonia, and **Xuguang Sheng**, American University (1067-Z1-336)

3:45PM ► (1599) *Sensitivity Analysis of Anaerobic Digestion Model No.1 (ADM1) Using Latin Hypercube Sampling: A case study in dairy manure digestion.*
Mondal Sumona*, Clarkson University, **Bo Zhang**, Civil and Environmental Engineering Department, Clarkson University, **Kathleen R. Fowler**, Clarkson University, and **Stefan Grimberg**, Civil and Environmental Engineering Department, Clarkson University (1067-Z1-2195)

4:00PM ► (1600) *Optimal points for a probability distribution on Cantor set.* Preliminary report.
Lakshmi Roychowdhury, Texas A&M University (1067-Z1-2253)

4:15PM (1601) *A Generalized Slope Based Scale-Invariant One Sample Nonparametric Test For Bivariate Location Problem.*
Sunil Mathur, University of Mississippi (1067-Z1-25)

4:30PM ► (1602) *The General, Irreducible Three and Four-State Markov Process.*
Lilinoe M. Harbottle*, California State Polytechnic University, Pomona, **Blake Hunter**, University of California, Davis, and **Alan Krinik**, California State Polytechnic University, Pomona (1067-Z1-1039)

4:45PM (1603) *Central Limit Theorem for Stochastic Flows.* Preliminary report.
William Pachas-Flores* and **Michael Cranston**, University of California, Irvine (1067-Z1-1838)

5:00PM (1604) *Shape Theorems For Evolving Sets on Two Dimensional Lattices.*
Timothy Prescott, University of North Dakota (1067-Z1-795)

5:15PM (1605) *An Exponentially fitted Second Derivative Method for linear singularly perturbed boundary value problems.*
Ramanjit K Sahi* and **Samuel N Jator**, Austin Peay State University (1067-Z1-691)

5:45PM (1606) *Formative Assessment: A Key Strategy for Calculus Teaching.* Preliminary report.
James R Choike*, Oklahoma State University, **Cos Fi**, University of Iowa, and **Vytas Laitusis**, The College Board (1067-Z1-1955)

SIAM Minisymposium on Frontiers in Geomathematics

1:00 PM – 6:25 PM   **Bayside A, 4th Floor, Sheraton**

Organizers: **Willi Freeden**, University of Kaiserslautern
Zuhair Nashed, University of Central Florida
Volker Michel, Universitaet Siegen
Thomas Soner, Technical University of Braunschweig, Germany

1:00PM (1607) *Correlation based imaging.*
George C. Papanicolaou, Stanford University (1067-60-1122)

1:30PM (1608) *Sphere Oriented Wavelets Based on Radial Basis Functions.*
Michael Schreiner, Univ. of Buchs NTB, Institute for Computational Engineereing (1067-41-473)

2:00PM (1609) *Role of Computational Science in Protecting the Environment: Geological Storage of CO2.*
Mary Fanett Wheeler, University of Texas at Austin (1067-65-828)

2:30PM ► (1610) *A Spatially Oriented Approach to Geomagnetic Modeling.*
Christian Gerhards, TU Kaiserslautern (1067-41-512)

3:00PM ► (1611) *Maximum-likelihood theory for the inversion of gravity and topography data to recover the elastic strength of a planetary lithosphere.*
Frederik J Simons*, Princeton University, and **Sofia C. Olhede**, University College London (1067-86-842)

3:30PM ► (1612) *3D-Modeling of Heat Transport in Deep Hydrothermal Reservoirs.* Preliminary report.
Isabel Ostermann, Fraunhofer ITWM Kaiserslautern, Germany (1067-86-546)

4:00PM (1613) *Locally mass-conservative Eulerian-Lagrangian methods for multiphase multicomponent transport.*
Thomas F. Russell, National Science Foundation (1067-65-1061)

4:30PM ► (1614) *Recovering a Tomographic Model of the Earth by Sparse Regularization of a Joint Inversion of Gravitational Data and Normal Mode Anomalies.*
Doreen Fischer, University of Siegen, Geomathematics Group (1067-65-308)

5:00PM (1615) *Moment discretization of ill-posed problems with discrete weakly bounded noise.* Preliminary report.
P. P.B. Eggermont*, **V. N. LaRiccia**, Food and Resource Economics, University of Delaware, and **M. Z. Nashed**, University of Central Florida (1067-45-996)

5:30PM (1616) *Data Analysis for the EOS Aura Microwave Limb Sounder.*
W. Van Snyder, California Institute of Technology Jet Propulsion Laboratory (1067-86-404)

6:00PM ► (1617) *Delayed Progress in Navigation: The Introduction of Line of Position Navigation in the 19th Century.*
Günther Oestmann, German Maritime Museum, Bremerhaven (1067-01-400)

NAM Granville-Brown-Haynes Session of Presentations by Recent Doctoral Recipients in the Mathematical Sciences

1:00 PM – 3:55 PM   Oak Alley Room, 4th Floor, Sheraton

▶ 1:00PM (1618) *Arithmetic Progressions in the y-coordinates of Certain Elliptic Curves.* **Alejandra Alvarado**, University of Arizona (1067-11-358)

1:30PM (1619) *Reflexivity and Grothendieck Space Property for Positive Tensor Products of Banach Lattices.* **Michelle R Craddock**, United States Military Academy (1067-46-518)

▶ 2:00PM (1620) *Super-Sech Solitons in Optical Fibers via the Variational Principle.* **Patrice D. Benson***, US Military Academy West Point, **Anjan Biswas**, **Dawn A. Lott**, Delaware State University, and **Daniala Milovic**, University of Nis (1067-78-1464)

2:30PM (1621) *On Independence Polynomials and Independence Equivalence in Graphs.* **L. Marie Chism**, University of Mississippi (1067-05-1750)

▶ 3:00PM (1622) *In Search of Pythagorean Triples.* **Marcus D. Ashford**, University of Alabama - Tuscaloosa, and **Katrina K. A. Cunningham***, Southern University - Baton Rouge (1067-11-1847)

▶ 3:30PM (1623) *Graphs of arbitrary excessive class.* **Michael E Young***, Iowa State University, and **Giuseppe Mazzuoccolo**, Dipartimento di Scienze e Metodi dell'Ingegneria, Università di Modena e Reggio Emilia (1067-05-1905)

AWM Michler-Mentoring Minisymposium

1:00 PM – 5:30 PM   La Galerie 1, 2nd Floor, Marriott

Organizers: **Georgia Benkart**, University of Wisconsin-Madison

J. Matthew Douglass, University of North Texas

1:00PM (1624) *A Meeting of Algebra and Geometry in Decorated Graphs.* **Rebecca F Goldin**, George Mason University, (1067-51-592)

1:30PM (1625) *An optimal metrization theorem for topological groupoids.* **Irina Mitrea**, University of Minnesota (1067-00-1870)

2:00PM (1626) *Heat kernel analysis on infinite-dimensional curved spaces.* **Masha Gordina**, University of Connecticut (1067-58-660)

2:30PM (1627) *Interplay of Combinatorics and Topology through Posets.* **Patricia L. Hersh**, North Carolina State University (1067-05-1124)

3:00PM (1628) *The Evolution of Spatio-Temporal Models of Tumor Angiogenesis.* **Trachette L. Jackson**, University of Michigan (1067-92-525)

3:30PM (1629) *Weak and numerical solutions for coupled Navier-Stokes, Darcy and transport equations.* **Beatrice Riviere**, Rice University (1067-65-2025)

4:00PM Panel Discussion: Mentors Count!

SIGMAA on Environmental Mathematics Session on the BP Oil Discharge, Energy, and the Environment

1:00 PM – 4:10 PM   Rhythms II and III, 2nd Floor, Sheraton

Organizer: **Ben Fusaro**, Florida State University

1:00PM (1630) *Modeling Near-Shore and Coastal Processes and Extreme Events.* **Clint Dawson**, Institute for Computational Engineering and Sciences, University of Texas at Austin (1067-Z8-2310)

▶ 1:50PM (1631) *The BP spill, peak oil, and the search for energy.* **John W. Day***, Dept. of Oceanography and Coastal Sciences, Louisiana State University, Baton Rouge, LA 70803, and **Mathew Moerschbaecher**, Department of Oceanography and Coastal Sciences, School of Renewable Natural Resources (1067-Z8-2097)

2:40PM (1632) *The role of mathematics and modeling in cleaning up the BP oil spill.* **James M. Hyman**, Tulane University (1067-Z8-2136)

▶ 3:30PM (1633) *Restoring Gulf Coast habitat after the BP oil spill.* **G. Paul Kemp**, National Audubon Society Louisiana Coastal Initiative (1067-Z8-2281)

MAA Committee on the Undergraduate Program in Mathematics Panel Discussion

1:00 PM – 2:20 PM   La Galerie 2, 2nd Floor, Marriott

Preparation and recruitment of future mathematics graduate students.

Organizer: **Amy Cohen**, Rutgers University

Panelists: **Dennis Davenport**, National Science Foundation

Phil Kutzko, University of Iowa

Ruth Haas, Smith College

Ulrica Wilson, Morehouse College

SIGMAA on Statistics Education Panel Discussion

1:00 PM – 2:20 PM | La Galerie 6, 2nd Floor, Marriott

Teaching statistics online.
Organizer: **Brian Gill**, Seattle Pacific University
Panelists: **Michelle Everson**, University of Minnesota
Patricia Humphrey, Georgia Southern University
Michael Miner, American Public University
Sue Schou, Idaho State University

AMS Invited Address

1:10 PM – 2:00 PM | Great Ballroom A-C, 5th Floor, Sheraton

(1634) *Conformal weldings in quantum gravity: Zippers, necklaces, and SLE.*
Scott R. Sheffield, Massachusetts Institute of Technology (1067-60-10)

ASL Invited Address

2:00 PM – 2:50 PM | Bayside C, 4th Floor, Sheraton

(1635) *Relational hidden variables and nonlocality.*
Samson Abramsky, University of Oxford (1067-03-62)

MAA Invited Address

2:15 PM – 3:05 PM | Great Ballroom A-C, 5th Floor, Sheraton

(1636) *Binary quadratic forms: From Gauss to algebraic geometry.*
Melanie Matchett Wood, American Institute of Mathematics and Stanford University (1067-A0-41)

MAA Minicourse #11: Part B

2:15 PM – 4:15 PM | Ile de France III, 3rd Floor, JW Marriott

Using video case studies in teaching a proof-based gateway course to the mathematics major.
Organizers: **James T. Sandefur**, Georgetown University
Connie M. Campbell, Milllsaps College
Kay Somers, Moravian College

MAA Minicourse #2: Part B

2:15 PM – 4:15 PM | Ile de France I, 3rd Floor, JW Marriott

Getting mathematics majors to think outside the book: Course activities that promote exploration, discovery, conjecture, and proof.
Organizers: **Suzanne Dorée**, Augsburg College
Jill Dietz, St. Olaf College
Brian P. Hopkins, St. Peter's College

MAA Minicourse #9: Part B

2:15 PM – 4:15 PM | Ile de France II, 3rd Floor, JW Marriott

Learning discrete mathematics via historical projects.
Organizers: **Jerry M. Lodder**, New Mexico State University
Guran Bezhanishvili, New Mexico State University
David J. Pengelley, New Mexico State University
Janet H. Barnett, Colorado State University, Pueblo

Rocky Mountain Mathematics Consortium Board of Directors Meeting

2:15 PM – 4:00 PM | Audubon Room, 5th Floor, Marriott

AMS Committee on Science Policy Panel Discussion

2:30 PM – 4:00 PM | Balcony M, 4th Floor, Marriott

A Conversation with Sastry Pantula, the New Director of the Division of Mathematical Sciences at the National Science Foundation.

MAA Panel Discussion

2:35 PM – 3:55 PM | La Galerie 6, 2nd Floor, Marriott

Inquiry-proof instructional techniques.
Organizers: **Tom Roby**, University of Connecticut
Dev Sinha, University of Oregon
Glenn Stevens, Boston University
Ravi Vakil, Stanford University
Panelists: **Keith Conrad**, University of Connecticut
Ken Ono, University of Wisconsin

David Pengelley, New Mexico State University

Margaret Robinson, Mount Holyoke College

Brad Shelton, University of Oregon

Michael Starbird, University of Texas

MAA Committee on Minority Participation-Society for the Advancement of Chicanos and Native Americans in Science-National Association of Mathematicians Panel Discussion

2:35 PM – 3:55 PM   La Galerie 2, 2nd Floor, Marriott

The role of mentoring in undergraduate mathematics: Promising recruitment and retention strategies.

Organizers: **William Velez**, University of Arizona

Sylvia Bozeman, Spelman College

Ken Millett, University of California, Santa Barbara

Panelists: **Sylvia Bozeman**

Michelle Craddock, U. S. Military Academy

Rebecca Garcia, Sam Houston University

William Velez

ASL Invited Address

3:00 PM – 3:50 PM   Bayside C, 4th Floor, Sheraton

(1637)   *Maximal almost disjoint families.*
Juris Steprans, York University
(1067-03-67)

MAA Presentations by Teaching Award Recipients

3:20 PM – 4:40 PM   Mardi Gras EFGH, 3rd Floor, Marriott

Organizers: **Barbara Faires**, Westminster College

David Bressoud, Macalester College

3:20PM   *What comes from within… when life*
(1638)   *serves you lemons.*
Zvezdelina Stankova, Mills College
(1067-A0-578)

3:50PM   *The problem of how to be a good teacher*
▶ (1639)   *is undecidable.* Preliminary report.
Erica Flapan, Pomona College
(1067-A0-965)

4:20PM   *Most things you worry about never*
(1640)   *happen…*
Karen Rhea, University of Michigan

MAA Poster Session on Research by Undergraduate Students

4:00 PM – 5:30 PM   Napoleon Ballroom, Sheraton

All participants are invited to view the posters and speak with the presenters.

Organizers: **Joyati Debnath**, Winona State University

Mike O'Leary, Towson University

Robert Vallin, Slippery Rock University

AWM Michler-Mentoring Minisymposium Panel Discussion

4:00 PM – 5:30 PM   La Galerie 1, 2nd Floor, Marriott

Mentors count!

Moderator: **Marie Vitulli**, University of Oregon

Panelists: **Allan Donsig**, University of Nebraska-Lincoln

Ruth Haas, Smith College

Rhonda Hughes, Bryn Mawr College

Trachette Jackson, University of Michigan

Moira Mc Dermott, Syracuse University

ASL Session for Contributed Papers, I

4:10 PM – 5:45 PM   Bayside C, 4th Floor, Sheraton

4:10PM   *Stability in generic graphs with free*
(1641)   *non-algebraic extensions.*
Justin Brody, Franklin and Marshall College

4:35PM   *Definable choice for a class of weakly*
(1642)   *o-minimal structures.*
Chris Laskowski, University of Maryland, and **Christopher Shaw***, Columbia College

5:00PM   *Type spaces and Wasserstein spaces.*
(1643)   **Shichang Song**, University of Illinois at Urbana-Champaign

5:25PM   *Characterizing infinite cardinals by*
(1644)   *countable linear orderings.*
Ioannis Souldatos, Minnesota State University

AMS Congressional Fellowship Session

4:30 PM – 6:30 PM   Balcony M, 4th Floor, Marriott

Speakers: **Katherine Crowley**, 2009-2010 AMS Congressional Fellow

Hugh MacMillan, 2010-2011 AMS Congressional Fellow

SIGMAA on Mathematics Instruction Using the Web Business Meeting and Open Discussion

4:30 PM – 6:00 PM   La Galerie 6, 2nd Floor, Marriott

> Come share your interests in teaching and learning mathematics online and discuss the direction of future WEB SIGMAA activities.

National Academies/Board on Mathematical Sciences and Their Applications Special Presentation

4:30 PM – 5:20 PM   Balcony L, 4th Floor, Marriott

> The Mathematical Sciences in 2025: A study commissioned by the National Science Foundation.
> Organizers: **Mark L. Green**, University of California Los Angeles
> **Scott Weidman**, National Academy of Sciences

SIGMAA on Mathematicians in Business, Industry, and Government Guest Lecture

5:00 PM – 5:45 PM   Rhythms II and III, 2nd Floor, Sheraton

> 5:00PM   *How mathematics is changing hollywood.*
> (1645)   **Tony DeRose**, Pixar Animation Studios (1067-A0-127)

MAA Dramatic Presentation

6:00 PM – 7:00 PM   Armstrong Ballroom, 8th Floor, Sheraton

> Derivative vs. Integral: The final showdown.
> Presenters: **Colin Adams**, Williams College
> **Thomas Garrity**, Williams College

SIGMAA on the Philosophy of Mathematics Business Meeting

6:00 PM – 6:30 PM   Rhythms I, 2nd Floor, Sheraton

SIGMAA on Mathematics and the Arts Business Meeting

6:00 PM – 7:00 PM   La Galerie 2, 2nd Floor, Marriott

SIGMAA on Environmental Mathematics Dramatic Presentation

6:00 PM – 7:00 PM   Mardi Gras EFGH, 3rd Floor, Marriott

> The Oil Volcano: Truth and Consequences.

AMS Mathematical Reviews Reception

6:00 PM – 7:00 PM   Oak Alley Room, 4th Floor, Sheraton

SIGMAA on Mathematicians in Business, Industry, and Government Reception

6:15 PM – 7:30 PM   Rhythms II and III, 2nd Floor, Sheraton

SIGMAA on the Philosophy of Mathematics Guest Lecture

6:30 PM – 7:15 PM   Rhythms I, 2nd Floor, Sheraton

> 6:30PM   *Will the real philosophy of mathematics*
> ▶ (1646)   *please stand up.* Preliminary report.
> **Keith Devlin**, Stanford University (1067-A0-1172)

NAM Cox-Talbot Address

7:30 PM – 8:15 PM   Waterbury Ballroom, 2nd Floor, Sheraton

> (1647)   Increasing the pool of underrepresented mathematicians.
> **Robert Bozeman**, Morehouse College (1067-97-183)

MAA/Project NExT Reception

8:30 PM – 10:30 PM   Gallery Ballroom, 1st Floor, Sheraton

> All Project NExT Fellows, consultants, and other friends of Project NExT are invited.
> Organizers: **Judith Covington**, Louisiana State University Shreveport
> **Joseph A. Gallian**, University of Michigan-Duluth
> **Aparna W. Higgins**, University of Dayton
> **P. Gavin LaRose**, University of Michigan

Sunday, January 9

Joint Meetings Registration

7:30 AM – 2:00 PM   Across from La Galerie 4, 2nd Floor, Marriott

Minority Chairs Breakfast

7:00 AM – 10:00 AM   Edgewood AB, 4th Floor, Sheraton

AMS-SIAM Special Session on Applications of Stochastic Processes in Neuroscience, I

8:00 AM – 10:50 AM La Galerie 5,
2nd Floor, Marriott

Organizers: **Peter Thomas**, Case
Western Reserve University

Kreso Josic, University of
Houston

Carson C. Chow, Institutes
of Health

8:00AM *Correlation shaping in spiking neurons.*
(1648) **Brent Doiron**, University of Pittsburgh
(1067-92-1436)

9:00AM *ON-OFF Episodic Activity: Noisy Oscillator*
(1649) *or Noise-Driven Attractor Dynamics.*
John Rinzel, Courant Inst of
Mathematical Sciences, New York
University (1067-92-714)

9:30AM *Probing intrinsic bistability in neurons*
▶ (1650) *with noise: a case of inverse stochastic*
resonance. Preliminary report.
Boris S Gutkin, Group for Neural Theory,
LNC INSERM U 960, Departement des
Etudes Cognitives, Ecole Normale
Superieure and CNRS (1067-92-720)

10:00AM *Synchronization of periodically forced*
(1651) *Ornstein Uhlenbeck processes with reset.*
Preliminary report.
Peter J. Thomas, Case Western Reserve
University (1067-92-498)

10:30AM *Linear PDE Models of Neurons with*
(1652) *Random Excitations*.*
Frederic Y. M. Wan, University of
California, Irvine (1067-92-490)

AMS-SIAM Special Session on Control and Inverse Problems for Partial Differential Equations, I

8:00 AM – 10:50 AM Napoleon D2,
3rd Floor, Sheraton

Organizers: **Ana-Maria Croicu**,
Kennesaw State University

Michele L. Joyner, East
Tennessee State University

8:00AM *New regularity conditions for the minimal*
▶ (1653) *time function.* Preliminary report.
Peter R Wolenski, Louisiana State
University (1067-35-1924)

8:30AM *Minimal Norm Control Asymptotics and*
(1654) *Numerical Approximations for the*
Null Controllability of Non-Standard
Parabolic-Like PDE Dynamics.
George Avalos, University of
Nebraska-Lincoln (1067-35-782)

9:00AM *Global uniqueness and stability in*
(1655) *determining coefficients for a system*
of coupled Schrodinger equations.
Preliminary report.
Roberto Triggiani* and **Shitao Liu**,
University of Virginia (1067-35-753)

9:30AM *Recovering a source from the*
(1656) *measurements of acceleration of wall*
vibrations in structural acoustic
problems.
Irena Lasiecka* and **Shitao Liu**,
University of Virginia (1067-35-594)

10:00AM *Electromagnetic Relaxation Time*
(1657) *Distribution Inverse Problems in the*
Time-domain.
Nathan L. Gibson, Oregon State
University (1067-35-807)

10:30AM *Challenges of Control / Optimization*
(1658) *Under Uncertainty.*
Ana-Maria Croicu, Kennesaw State
University (1067-49-746)

AMS Special Session on Asymptotic Methods in Analysis with Applications, I

8:00 AM – 10:50 AM Borgne Room,
3rd Floor, Sheraton

Organizers: **Diego Dominici**, State
University of New York at
New Paltz

Peter A. McCoy, U.S. Naval
Academy

8:00AM *Two Bessel Function Series in*
(1659) *Ramanujan's Lost Notebook.*
Bruce C. Berndt, University of Illinois
(1067-33-955)

8:30AM *Asymptotic Expansions of Certain Partial*
(1660) *Theta Functions.*
Bruce C. Berndt, University of Illinois,
and **Byungchan Kim***, Seoul national
university of science and technology
(1067-33-306)

9:00AM *The Asymptotic Hadamard Conjecture.*
(1661) Preliminary report.
E. Rodney Canfield, Dept. of Computer
Science, Univ. of Georgia (1067-05-1695)

9:30AM Γ-*convergence of Power-Law Functionals*
(1662) *and Applications to Polycrystal Plasticity.*
Cristina Popovici, North Dakota State
University (1067-49-85)

10:00AM *Densities of short uniform random walks.*
(1663) **Jonathan M Borwein***, CARMA,
University of Newcastle NSW Australia,
Armin Straub, Tulane University, **James
Wan** and **Wadim Zudilin**, CARMA
(1067-41-298)

10:30AM *Asymptotic Analysis of Dynamic Storage*
(1664) *Allocation Models.*
Charles Knessl*, University of Illinois at
Chicago, and **Sohn Eunju**, University of
Georgia (1067-41-816)

AMS Special Session on Formal Mathematics for Mathematicians: Developing Large Repositories of Advanced Mathematics, II

8:00 AM – 10:50 AM Conde, 3rd Floor, JW Marriott

Organizers: **Krystyna M. Kuperberg**,
Auburn University

Andrzej Trybulec,
University of Bialystok

Artur Kornilowicz,
University of Bialystok

Adam Naumowicz,
University of Bialystok

8:00AM *Type inference in finite group theory.*
(1665) **Jeremy Avigad**, Department of
Philosophy, Carnegie Mellon University
(1067-03-910)

8:30AM *Mechanizing the Odd Order Theorem:*
(1666) *Local Analysis.*
Georges Gonthier, Microsoft Research
(1067-03-836)

9:00AM *Mizar-supported maths teaching at the*
▶ (1667) *university level.*
Adam Naumowicz* and **Artur
Kornilowicz**, Institute of Informatics,
University of Bialystok, Poland
(1067-97-1443)

9:30AM *Recent achievement of codification on*
(1668) *real analysis in Mizar.*
Yasushige Watase*, Shinshu University,
Faculty of Engineering, **Noboru Endo**,
Gifu National College of Technology,
Dept. of Electronic Control Engineering,
and **Yasunari Shidama**, Shinshu
University, Faculty of Engineering
(1067-68-1135)

10:00AM *Computerising Mathematical texts with*
▶ (1669) *MathLang.*
Fairouz Kamareddine, Heriot-Watt
University (1067-03-1396)

10:30AM *The language of mathematics in Mizar.*
▶ (1670) **Artur Kornilowicz*** and **Adam
Naumowicz**, Institute of Informatics,
University of Bialystok, Poland
(1067-68-1444)

AMS Special Session on Multivariable Operator Theory, II

8:00 AM – 10:50 AM   **Maurepas, 3rd
Floor, JW Marriott**

Organizers: **Ronald G. Douglas**, Texas
A&M University
Gelu F. Popescu, University
of Texas at San Antonio

8:00AM *Non-commutative Inequalities.*
(1671) **J William Helton**, UC San Diego
(1067-47-636)

8:30AM *Multivariable Nevanlinna-Pick*
(1672) *interpolation and connections with
control theory.*
Joseph A. Ball, Virginia Tech
(1067-47-908)

9:00AM *Ergodic actions of convergent*
(1673) *Fuchsian groups on quotients of the
noncommutative Hardy algebras.*
Alvaro Arias* and **Frederic
Latremoliere**, University of Denver
(1067-47-522)

9:30AM *Commutative operator algebras and*
(1674) *realizations of polynomials on domains
in $\mathbb{C}^n$.* Preliminary report.
Michael Jury, University of Florida
(1067-47-693)

10:00AM *Invariant subspaces of nilpotent*
▶ (1675) *operators.*
Markus Schmidmeier, Florida Atlantic
University (1067-16-839)

10:30AM *Operators Cauchy dual to*
(1676) *2-hyperexpansive operators.* Preliminary report.
Raul E Curto, The University of Iowa
(1067-47-611)

AMS Special Session on Mathematics Related to Feynman Diagrams, II

8:00 AM – 10:45 AM   **Frontenac, 3rd
Floor, JW Marriott**

Organizers: **Victor H. Moll**, Tulane
University
Olivier Espinosa,
Universidad Santa Maria,
Valparaiso

8:00AM *From Feynman diagrams to Potts models:*
(1677) *a motivic approach.* Preliminary report.
Paolo Aluffi, Florida State University,
and **Matilde Marcolli***, Caltech
(1067-81-1420)

9:00AM *On the method of brackets.*
(1678) **Armin Straub**, Tulane University
(1067-33-1720)

10:00AM *The Hypergeometric Representation of*
(1679) *Feynman Diagrams and Construction of
the Epsilon Expansion.*
Scott A. Yost*, The Citadel, **Vladimir V.
Bytev**, **Mikhail Yu. Kalmykov**, Hamburg
Univ. Inst. Theoretical Physics II and
J.I.N.R., Dubna, **Bernd A. Kniehl**,
Hamburg Univ. Inst. Theoretical Physics
II, and **B. F. L. Ward**, Baylor University
(1067-81-1500)

AMS Special Session on Analysis of Reaction-Diffusion Models, I

8:00 AM – 10:50 AM   **Napoleon C3,
3rd Floor, Sheraton**

Organizers: **Junping Shi**, College of
William and Mary
Xuefeng Wang, Tulane
University

8:00AM *Diffusive logistic equation with non-linear*
(1680) *boundary conditions.*
Jerome Goddard II*, Mississippi State
University, **Eun Kyoung Lee**, Pusan
National University, and **Ratnasingham
Shivaji**, Mississippi State University
(1067-35-302)

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8:30AM (1681) *Positioning the Z-ring near the mid-cell via the spatio-temporal oscillation of the Min system.*
Zhigang Zhang, University of Houston (1067-35-1948)

9:00AM (1682) *Random dispersal versus fitness-dependent dispersal.*
Robert Stephen Cantrell*, **Chris Cosner**, University of Miami, **Yuan Lou** and **Chao Xie**, Ohio State University (1067-35-776)

9:30AM (1683) *Spatial Spreading Dynamics in Nonlocal Monostable Equations in Spatially Periodic Habitats.*
Wenxian Shen* and **Aijun Zhang**, Auburn University (1067-35-1267)

10:00AM (1684) *Renormalization Group Method for Semi-Strong Pulse Interactions.*
Thomas Bellsky* and **Keith Promislow**, Michigan State University (1067-35-131)

10:30AM (1685) *A One-Dimensional Nonlinear Stability Analysis of Vegetative Pattern Formation for an Interaction-Diffusion Plant-Surface Water Model System in an Arid Flat Environment.*
Bonni J Kealy* and **David J Wollkind**, Washington State University (1067-92-433)

AMS Special Session on Continued Fractions, I

8:00 AM – 10:45 AM   Napoleon D3, 3rd Floor, Sheraton

Organizers: **James G. McLaughlin**, West Chester University
Nancy J. Wyshinski, Trinity College

8:00AM (1686) *Biorthogonal Rational Functions and R Fractions.*
Mourad E. H. Ismail, City University of Hong Kong (1067-33-626)

▶ 9:00AM (1687) *On periodic Jacobi-Perron algorithm over formal power series field.* Preliminary report.
Amara Chandoul, Superior Institute of Computer and meltimedia Sfax-Tunisia (1067-11-204)

9:30AM (1688) *Szegő polynomials and para-orthogonal polynomials associated with hypergeometric functions.* Preliminary report.
Dimitar K. Dimitrov and **Alagacone Sri Ranga***, Universidade Estadual Paulista (1067-33-1452)

10:00AM (1689) *Convergence of continued fractions.* Preliminary report.
Lisa Lorentzen, Norwegian University of Science and Technology (1067-40-1950)

AMS Special Session on Noncommutative Harmonic Analysis and Dynamic Systems, I

8:00 AM – 10:50 AM   Napoleon B3, 3rd Floor, Sheraton

Organizers: **Tao Mei**, Wayne State University
Alan D. Wiggins, University of Michigan at Dearborn

8:00AM (1690) *Entropy and Fuglede-Kadison determinant.*
Hanfeng Li, SUNY at Buffalo (1067-37-198)

8:30AM (1691) *Entropy and the variational principle for actions of sofic groups.*
David Kerr*, Texas A&M University, and **Hanfeng Li**, SUNY at Buffalo (1067-37-304)

9:00AM (1692) *Cohomology on measure preserving equivalence relations.*
Jesse D. Peterson, Vanderbilt University (1067-46-1519)

9:30AM (1693) *Operator algebras with contractive approximate identities.* Preliminary report.
David P Blecher, University of Houston (1067-47-272)

10:00AM (1694) *Strong solidity for group factors from lattices in* $SO(n, 1)$ *and* $SU(n, 1)$
Thomas Sinclair, Vanderbilt University (1067-46-932)

10:30AM (1695) *A Lower Bound for the Spectral Radius of Random Walks on the Baumslag-Solitar Group.*
Daniel E. L. Redelmeier* and **Ken Dykema**, Texas A&M University (1067-46-602)

AMS Special Session on Combinatorial Algebraic Geometry, I

8:00 AM – 10:50 AM   Napoleon B2, 3rd Floor, Sheraton

Organizers: **Frank Sottile**, Texas A&M University
Alexander T. Yong, University of Illinois, Urbana-Champaign

8:00AM (1696) *Degeneration of Frobenius splittings, and Kazhdan-Lusztig varieties.*
Allen Knutson, Cornell University (1067-14-1698)

8:30AM (1697) *Local complete intersection Schubert varieties.* Preliminary report.
Alexander Woo*, Saint Olaf College, and **Henning Ulfarsson**, Reykjavik University (1067-14-1289)

9:00AM (1698) *Permutation group representations and (equivariant) cohomology of Hessenberg varieties.*
Julianna Tymoczko, University of Iowa (1067-14-2291)

9:30AM *Positivity in the Symplectic Category.*
(1699) **Rebecca F Goldin***, George Mason University,, and **Susan Tolman**, University of IL, Champaign-Urbana (1067-51-1688)

10:00AM *Polyhedral Adjunction Theory.*
► (1700) **Sandra Di Rocco**, KTH Stockholm, **Christian Haase**, FU Berlin, **Benjamin Nill***, University of Georgia, and **Andreas Paffenholz**, TU Darmstadt (1067-52-647)

10:30AM *Equivariant methods for hypergeometric*
(1701) *systems.*
Christine Berkesch*, Stockholm University, and **Laura Felicia Matusevich**, Texas A&M University (1067-14-819)

AMS Special Session on Nonlinear Evolution Equations, Analysis, and Geometry, II

8:00 AM – 10:50 AM **Maurepas Room, 3rd Floor, Sheraton**

Organizers: **Ralph Saxton**, University of New Orleans

Feride Tiglay, Fields Institute

8:00AM *Systems of conservation or balance laws*
(1702) *with Lorentz-rotation symmetry.*
Michael Sever, The Hebrew University of Jerusalem (1067-35-282)

8:30AM *Localization, Smoothness, and*
(1703) *Convergence to Equilibrium for a Thin Film Equation.*
Eric A Carlen, Rutgers University, and **Suleyman Ulusoy***, University of Maryland (1067-35-426)

9:00AM *Newtonian limits of complex fluid models.*
(1704) **Milton C. Lopes Filho**, University of Campinas (1067-76-2313)

9:30AM *Stability of Solitary-Wave Solutions of the*
(1705) *Hirota-Satsuma Equation.*
Jerry L. Bona, University of Illinois at Chicago (1067-35-951)

10:00AM *Euler-Arnold equations on orbits of*
(1706) *diffeomorphism groups.*
Gerard Misiolek, Univ. of Notre Dame (1067-58-1331)

10:30AM *Two-dimensional incompressible flows as*
(1707) *limits of 3D helical flows.* Preliminary report.
Milton C Lopes Filho, IMECC - UNICAMP, **Dongjuan Niu**, Capitol Normal University, Beijing, PRC, **Edriss S Titi**, University of California, Irvine and Weizmann Institute, and **Helena J Nussenzveig Lopes***, IMECC-UNICAMP (University of Campinas) (1067-35-2106)

AMS Special Session on Structure Theory for Matroids and Graphs, I

8:00 AM – 10:50 AM **Napoleon C2, 3rd Floor, Sheraton**

Organizers: **Bogdan Oporowski**, Louisiana State University

James G. Oxley, Louisiana State University

8:00AM *Graphs that are Almost Series-Parallel.*
(1708) **Lisa M Warshauer**, Louisiana State University (1067-05-1196)

8:30AM *3-connected graphs of path-width at*
(1709) *most three.*
Stan Dziobiak* and **Guoli Ding**, Louisiana State University (1067-05-1583)

9:00AM *Excluding a small minor.*
(1710) **Guoli Ding**, LSU, and **Cheng Liu***, Central South University, China (1067-05-1593)

9:30AM K_5-*subdivisions in 5-connected nonplanar*
(1711) *graphs.*
Xingxing Yu* and **Jie Ma**, Georgia Institute of Technology (1067-05-2416)

10:00AM *2-crossing-critical graphs.*
► (1712) **Drago Bokal**, University of Maribor, **Bogdan Oporowski**, Louisiana State University, **R. Bruce Richter***, University of Waterloo, and **Gelasio Salazar**, Universidad Autonoma San Luis Potosi (1067-05-440)

10:30AM *On graph well-quasi-order by topological*
► (1713) *inclusion.*
Neil Robertson, Ohio State University (1067-05-2373)

AMS Special Session on Knot Theory, II

8:00 AM – 10:50 AM **Napoleon C1, 3rd Floor, Sheraton**

Organizers: **Tim D. Cochran**, Rice University

Shelley Harvey, Rice University

8:00AM *Seifert fibered Dehn filling.* Preliminary
(1714) report.
Cameron McA. Gordon*, University of Texas at Austin, **Steven Boyer**, UQAM, and **Xingru Zhang**, SUNY Buffalo (1067-57-825)

8:30AM *A Generalization of the Turaev Cobracket*
(1715) *and the Minimal Self-Intersection Number.*
Patricia Cahn, Dartmouth College (1067-57-639)

9:00AM *Cube Number Distinguishes Legendrian*
(1716) *Type for Certain Torus Knots.* Preliminary report.
Ben M McCarty, Louisiana State University (1067-57-505)

9:30AM   *Satellites of knots and bordered*
(1717)   *Heegaard Floer homology.*
         Ina Petkova, Columbia University
         (1067-54-616)

10:00AM *The topology of Springer varieties.*
(1718)   **Heather M. Russell**, Louisiana State
         University (1067-57-759)

10:30AM *Reconstructing* HFK⁻ *from sutured Floer*
(1719)   *homology.*
         John Etnyre, Georgia Tech, **David Shea
         Vela-Vick*** and **Rumen Zarev**, Columbia
         University (1067-57-744)

AMS Special Session on Time Scales: Theory and Applications, I

8:00 AM – 10:50 AM   Napoleon B1,
                                        3rd Floor, Sheraton

         Organizers: **Billy Jackson**, Saint Xavier
                     University
                     Joan Hoffacker, Clemson
                     University

8:00AM   *Fundamentals of Nonlinear Control on*
(1720)   *Time Scales.* Preliminary report.
         Billy Jackson, St. Xavier University
         (1067-93-361)

8:30AM   *The Laplace Transform in Discrete*
▶ (1721) *Fractional Calculus.*
         Michael Holm, University of
         Nebraska–Lincoln (1067-39-501)

9:00AM   *Asymptotic Equivalence Classes and*
(1722)   *Regions of Time Scale Exponential
         Stability.* Preliminary report.
         John M Davis, Baylor University
         (1067-93-1930)

9:30AM   *Generalized time scales and the Hahn*
(1723)   *quantum variational calculus.*
         Agnieszka B. Malinowska* and **Delfim
         F. M. Torres**, University of Aveiro,
         Portugal (1067-49-449)

10:00AM *Asymptotic behavior of an n-th order*
(1724)   *sublinear dynamic equation.*
         A Peterson, University of
         Nebraska-Lincoln (1067-34-379)

10:30AM *Mean Square Stability of Ito-Volterra*
▶ (1725) *Dynamic Equation.*
         Suman Sanyal, Marshall University
         (1067-00-1610)

AMS Session on Probability, I

8:00 AM – 10:55 AM   Bayside B, 4th Floor, Sheraton

8:00AM   *Period-2 behavior and spatial*
(1726)   *correlations in a probabilistic lattice
         model of the cardiac cell.*
         Robert J Rovetti, Loyola Marymount
         University (1067-60-2317)

8:15AM   *Comparing the distributions of various*
(1727)   *supremums on two-time parameter
         Wiener space.* Preliminary report.
         David L. Skoug, University of
         Nebraska-Lincoln (1067-60-1734)

8:30AM   *Reflection principle(s) for the multiple*
(1728)   *parameter Wiener process?* Preliminary
         report.
         Ian Pierce, University of Nebraska -
         Lincoln (1067-60-2046)

8:45AM   *A 'Cousin of Coboundary' Theorem for*
(1729)   *C*[0, 1]*-Valued Random Fields with
         Moment Conditions.* Preliminary report.
         Steven T. Morrow, Indiana University
         (1067-60-2292)

9:00AM   *A New Asymptotic Expansion for*
(1730)   *Distributions of Sums of Random
         Variables.*
         Ross P Hilton*, **Kenneth S Berenhaut**
         and **James W Chernesky**, Wake Forest
         University (1067-60-1787)

9:15AM   *Tracking communities with a*
(1731)   *graph-valued Markov process.*
         James P Ferry, Metron, Inc.
         (1067-60-2041)

9:30AM   *Birth-Death Markov chains Having*
(1732)   *Hyper-Probability Transitions.*
         Mark Burgin, University of California,
         Los Angeles, **Mark Dela***, California State
         Polytechnic University, Pomona, **Alan
         Krinik**, California State Polytechnic Univ.,
         Pomona, and **David Luu**, California
         State Polytechnic University, Pomona
         (1067-60-1710)

9:45AM   *Analogue of Hardy's Inequality for a*
(1733)   *Renewal Process.* Preliminary report.
         Constantine Georgakis, DePaul
         University (1067-60-2320)

10:00AM *A test for testing the equality of*
(1734)   *covariance operators.*
         Krishna Kaphle*, **Frits H. Ruymgaart**
         and **George Gaines**, Texas Tech
         University (1067-60-2135)

10:15AM *Weighted and Unweighted Random Walks*
▶ (1735) *of Multiple Entities on a Torus-Shaped
         World.* Preliminary report.
         Richard Freedman* and **Errin Fulp**,
         Wake Forest University (1067-60-1705)

10:30AM *Using TPA to count linear extensions.*
(1736)   **Jacqueline Banks**, University of
         California, Riverside, **Scott Garrabrant**,
         Pitzer College, **Mark L Huber***,
         Claremont McKenna College, and
         Anne Perizzolo, Columbia University
         (1067-60-1358)

10:45AM *Predictive Methods in Coupon Collection.*
▶ (1737) Preliminary report.
         Chelsea R Ross* and **Brooks E Smith**,
         East Tennessee State University
         (1067-60-1785)

AMS Session on Group Theory, I

8:00 AM – 10:55 AM   Mardi Gras F,
                                        3rd Floor, Marriott

8:00AM   *An Algorithm to Express Words as*
(1738)   *Conjugates of Relators.*
         Ellen M Ziliak*, Benedictine University,
         and **Alexander Hulpke**, Colorado State
         University (1067-20-225)

8:15AM An Investigation into an Amalgam
(1739) between an $SU_3(q)$ and an $SL_3(q)$:
Preliminary Report. Preliminary report.
Philip Keen, University of Birmingham
(1067-20-373)

8:30AM On the number of maximal subgroups of
▶ (1740) a finite solvable group. Preliminary
report.
Benjamin Newton, Beloit College
(1067-20-1096)

8:45AM Lower Central Series and Derived Series
(1741) of the Free Nilpotent Groups of Finite
Rank. Preliminary report.
Mark Pedigo, Saint Louis University
(1067-20-1125)

9:00AM Capability of p-groups of class 2 and
(1742) exponent p. Preliminary report.
Arturo Magidin*, University of Louisiana
at Lafayette, and **Robert Fitzgerald
Morse**, University of Evansville
(1067-20-1174)

9:15AM Injectors in Direct Products of Finite
(1743) Solvable Groups.
Joseph Evan, King's College
(1067-20-1454)

9:30AM Nonabelian tensor products: the mystery
(1744) of compatible actions. Preliminary report.
Luise-Charlotte Kappe, State
University of New York at Binghamton
(1067-20-1546)

9:45AM The base of a permutational wreath
(1745) product.
Elizabeth Wilcox, Colgate University
(1067-20-1650)

10:00AM Characterizing Containment
(1746) of Subgroups in a Direct Product.
Preliminary report.
Dandrielle Lewis, Binghamton University
(1067-20-1960)

10:15AM Counting subgroups of S_{n+1} normalized
(1747) by and coprime to a nonabelian regular
subgroup of order n. Preliminary report.
Stephen M. Gagola, Jr, Kent State
University (1067-20-2121)

10:30AM IA-automorphisms of wreath products.
(1748) **Margaret H Dean**, Borough of Manhattan
Community College (CUNY), **Gretchen
Ostheimer**, Hofstra University, and
Marcos Zyman*, Borough of
Manhattan Community College (CUNY)
(1067-20-2176)

10:45AM The Interassociates of the Bicyclic
(1749) Semigroup.
Berit Nilsen Givens* and **Amber Rosin**,
Cal Poly Pomona (1067-20-2225)

AMS Session on Topics in Mathematical Physics

8:00 AM – 10:55 AM   Cornet Room,
8th Floor, Sheraton

8:00AM Optimization of an Antenna Structure for
(1750) a Photovoltaic Nanodevice.
Emily J Forney, Clemson University
(1067-00-1676)

8:15AM Electromagnetic Scattering from Large
(1751) Cavities.
Weiwei Zhang, King's College
(1067-78-1582)

8:30AM Phase Diagram Calculation via
▶ (1752) Constrained Optimization.
Sandra Jeannette Varela, California
State University, Scaramento
(1067-00-2328)

8:45AM Arc-wise connectedness of solution sets
(1753) of quantum stochastic differential
inclusions.
Ezekiel Olusola Ayoola, University of
Ibadan, Nigeria (1067-81-71)

9:00AM Classification of symmetric states under
▶ (1754) local unitary action.
Curt D Cenci, Lebanon Valley College
(1067-81-157)

9:15AM The basic physics of Feynman diagrams.
▶ (1755) **Ivan Gonzalez**, Departamento de
Fisica, Universidad Santa Maria, Chile
(1067-81-1421)

9:30AM Critical Temperature of Ising
(1756) Ferromagnets and Spectral Curve of
Dimers.
Zhongyang Li, Brown University
(1067-82-44)

9:45AM A Cluster Expansion Approach to
(1757) Renormalization Group Transformations.
Mei Yin, University of Texas at Austin
(1067-82-218)

10:00AM Distributional Sensitivity in
▶ (1758) Polycrystalline Grain Growth Simulations.
Ross Robert Kistler, Loyola University
Maryland (1067-82-1732)

10:15AM Symmetry breaking in quasi-1D Coulomb
(1759) systems.
Paul H Jung*, Sogang University,
Michael Aizenman, Princeton University,
and **Sabine Jansen**, Weierstrass Institute
(1067-82-1833)

10:30AM Orbifolds, the A, D, E Family of Caustic
▶ (1760) Singularities, and Gravitational Lensing.
Amir Babak Aazami, Duke University
(1067-83-1984)

10:45AM Geometry of the Random Time Delay
▶ (1761) Surface and the Expected Number
of Lensed Images in Microlensing.
Preliminary report.
Alberto M. Teguia* and **Arlie Petters**,
Duke University (1067-83-2211)

AMS Session on Complex Analysis

8:00 AM – 10:55 AM   **Rosalie, 3rd Floor, JW Marriott**

8:00AM *Interpolation Sequence for the Spaces*
(1762) $H_+^q(\varphi)(q \geq 1)$.
        Maher M.H. Marzuq, Plymouth, Massachusetts (1067-30-59)

8:15AM *Regularity of Solutions to Extremal*
(1763) *Problems in Bergman Spaces.*
        Tim Ferguson, University of Michigan, Ann Arbor (1067-30-217)

8:30AM *On a refinement of Sendov's conjecture*
(1764) *(part 2).* Preliminary report.
        Michael J Miller, Le Moyne College (1067-30-1422)

8:45AM *Iceberg-type Problems: Estimating*
(1765) *Hidden Parts of a Convex Continuum from the Visible Parts.*
        Matthew H Lochman*, **Roger W Barnard** and **Alexander Yu Solynin**, Texas Tech University (1067-30-1591)

9:00AM *Construction of Complex-Valued*
(1766) *Harmonic Mappings Convex in One or Every Direction.* Preliminary report.
        Stacey Muir, University of Scranton (1067-30-1563)

9:15AM *Hypergeometric functions and subclasses*
(1767) *of Harmonic Mappings.*
        R. M. Ali, **See Keong Lee***, **Chandrashekar R.** and **K. G. Subramanian**, Universiti Sains Malaysia (1067-30-2305)

9:30AM *Porosity and limit sets.*
(1768) **Andrew Lazowski**, Sacred Heart University (1067-00-1299)

9:45AM *Comparison of Conformal Metrics.*
(1769) **Kourosh Tavakoli**, City University of New York (1067-30-1803)

10:00AM *Riemann-Hilbert families of Schwarzian*
(1770) *equations on the punctured torus.*
        David J Pinchbeck, St. Joseph's College of Maine (1067-30-1544)

10:15AM *Thomae formula for general cyclic covers*
(1771) *of* $\mathbb{CP}^1$.
        Yaacov Kopeliovich, Meag, NY (1067-32-513)

10:30AM *The Roles Played by Order of Convexity*
(1772) *or Starlikeness and the Bloch Condition in the Extension of Mappings from the Disk to the Ball.* Preliminary report.
        Jerry R. Muir, Jr., University of Scranton (1067-32-1554)

10:45AM *Classifying Homogeneous Trees and*
(1773) *Lattices.*
        Lucio M-G Prado, BMCC-The City University of New York (1067-31-2218)

MAA Session on New and Continuing Connections between Math and the Arts, II

8:00 AM – 10:55 AM   **Grand Chenier Room, 5th Floor, Sheraton**

        Organizer: **Douglas E. Norton**, Villanova University

8:00AM *Using Art to Inspire Conceptual*
(1774) *Understanding of Fractions.*
        Rachel B Manspeaker*, **Andrew Bennett**, **Hien Nguyen** and **Peter Nguyen**, Kansas State University (1067-S1-1520)

8:20AM *Student-Written Plays in a History of*
▶ (1775) *Mathematics Class.*
        Harrison W. Straley, Wheaton College (1067-S1-344)

8:40AM *Math and the art of M.C. Escher.*
(1776) **Anneke Bart**, Saint Louis University (1067-S1-1004)

9:00AM *Mathematics, Excel, and Graphic Design*
▶ (1777) *in Multicultural Alphabet Books for Papua New Guinea.*
        Deane E Arganbright* and **Susan C Arganbright**, Divine Word University (Papua New Guinea) (1067-S1-233)

9:20AM *Teaching Mathematics Through Music for*
▶ (1778) *a Liberal Arts Audience.* Preliminary report.
        Kurt E Ludwick, Salisbury University (1067-S1-1827)

9:40AM *Inversions and the Dihedral Group in*
▶ (1779) *Music.* Preliminary report.
        Craig M. Johnson, Marywood University (1067-S1-2216)

10:00AM *What Does That Picture Sound Like?*
(1780) *Calculus and Photosounder.*
        Phil Gustafson, Mesa State College (1067-S1-888)

10:20AM *How to cook up a math poem in n easy*
▶ (1781) *steps.* Preliminary report.
        Caleb Emmons, Pacific University (1067-S1-791)

10:40AM *Decoding DaVinci.*
▶ (1782) **Susan McBurney**, Western Springs, IL (1067-S1-384)

MAA Session on Trends in Undergraduate Mathematical Biology Education, I

8:00 AM – 10:55 AM   **Rhythms I, 2nd Floor, Sheraton**

        Organizers: **Timothy D. Comar**, Benedictine University
                    Raina Robeva, Sweet Briar College
                    Mike Martin, Johnson County Community College

8:00AM *What do we mean when we say we "want*
(1783) *students to understand exponential growth?".*
        Carlos W Castillo-Garsow, Kansas State University (1067-X1-2047)

8:20AM (1784) *An ethnographic case study of precision taught bio-calculus.*
Brian Arthur Christopher* and **Rebecca-Anne Dibbs**, University of Northern Colorado (1067-X1-1675)

8:40AM ► (1785) *Motivating the Biology in Biocalculus Courses.*
Timothy D Comar, Benedictine University (1067-X1-700)

9:00AM ► (1786) *Undergraduate Mathematical Biology Research at Truman State University.* Preliminary report.
Pam J Ryan, Truman State University (1067-X1-1689)

9:20AM (1787) *Biomath is more than theorems with biological examples: an integrative framework.*
Dmitry A Kondrashov, University of Chicago (1067-X1-2165)

9:40AM ► (1788) *Title of paper: Biology and Mathematics: The Exciting Nexus for the Advancement of Sciences.* Preliminary report.
Sumona Mondal, Clarkson University (1067-X1-1968)

10:00AM (1789) *Undergraduate Student Mentoring – Minority Participation, Retention, Motivation for Higher Studies.* Preliminary report.
Urmi Ghosh-Dastidar, NYCCT, CUNY (1067-X1-2268)

10:20AM ► (1790) *Development and Implementation of an Undergraduate Honors Course on Mathematical Ecology.* Preliminary report.
Vrushali A Bokil* and **Julia A Jones**, Oregon State University (1067-X1-2241)

10:40AM (1791) *An Intro to Mathematical Biology Course for Biology Majors.*
Sarah A Hews, Swarthmore College (1067-X1-1979)

MAA Session on Effective Teaching of Upper Level Mathematics to Secondary Education Mathematics Majors, II

8:00 AM – 10:55 AM   **Mardi Gras BC, 3rd Floor, Marriott**

Organizer: **Joyati Debnath**, Winona State University

8:00AM ► (1792) *Lines and circles: A range of viewpoints.* Preliminary report.
Kevin Hartshorn, Moravian College (1067-E1-2161)

8:20AM ► (1793) *Differing views on assessment: Two instructors' strategies for modeling assessment techniques for prospective secondary mathematics teachers in an upper level team-taught geometry course.* Preliminary report.
Sarah K. Bleiler*, **Gladis Kersaint** and **Milé Krajcevski**, University of South Florida (1067-E1-1674)

8:40AM ► (1794) *Geometry for Prospective Mathematics Teachers.*
Vesna Kilibarda, Indiana University Northwest (1067-E1-1249)

9:00AM ► (1795) *Revisiting College Geometry: Making it Relevant for Math, Math Education and Elementary Education Majors.*
Talitha M. Washington, University of Evansville (1067-E1-1240)

9:20AM ► (1796) *Geometry then and now: Making room for Euclid in the 21st century mathematics curriculum.*
Mark A Miller, Marietta College (1067-E1-305)

9:40AM (1797) *Experiencing the history of mathematics in a capstone course for prospective teachers.* Preliminary report.
Jennifer A Bergner, Salisbury University (1067-E1-1147)

10:00AM ► (1798) *History of Mathematics for Prospective Secondary Teachers.*
Kenneth J Bernard, Virginia State University (1067-E1-1466)

10:20AM ► (1799) *Research-Based Methods for Improving Learning and Assessment.*
Amy Mihnea, Florida Atlantic University (1067-E1-1822)

10:40AM (1800) *Helping Pre-service Teachers Recognize Continuity in the Secondary Curriculum.*
Kristin A. Camenga* and **Rebekah Yates**, Houghton College (1067-E1-731)

MAA Session on Influences of the Calculus Reform Movement on the Teaching of Mathematics, I

8:00 AM – 10:55 AM   **Grand Couteau Room, 5th Floor, Sheraton**

Organizers: **Steven R. Benson**, Lesley University

Marilyn Carlson, Arizona State University

Ellen E. Kirkman, Wake Forest University

Joe Yanik, Emporia State University

8:00AM ► (1801) *Twenty Years of Calculus Reform at Duke University.* Preliminary report.
Jack Bookman, Duke University (1067-J1-1150)

8:20AM (1802) *Comparing Calculus classes before the start of Calculus Reform and Calculus classes today.*
Stephen R. Hilbert, Ithaca College (1067-J1-2078)

8:40AM ► (1803) *Teaching College Mathematics Before, During and after the Calculus Reform Movement: A Retrospective Prospective.* Preliminary report.
Ann E Moskol, Rhode Island College (1067-J1-1788)

9:00AM ► (1804) *Reflections on Calculus Reform: How I Was Taught vs. How I Teach.*
Sarah L Mabrouk, Framingham State University (1067-J1-2315)

9:20AM (1805) *21st Century Calculus Reform: Don't Just Paint the Walls and Rearrange the Furniture.*
Mariah Birgen* and **Brian Birgen**, Wartburg College (1067-J1-246)

9:40AM ► (1806) *Calculus reform: What next?*
Patricia Baggett*, New Mexico State University, and **Andrzej Ehrenfeucht**, University of Colorado (1067-J1-1139)

10:00AM ► (1807) *Calculus Reform and AP Calculus.*
Michael E Boardman*, Pacific University, and **Stephen L Davis**, Davidson College (1067-J1-1368)

10:20AM ► (1808) *Have a Good Conclusion: The Value of Ending a Year-Long Calculus Course with an Introduction to Differential Equations.* Preliminary report.
Patti Frazer Lock, St. Lawrence University (1067-J1-2070)

10:40AM (1809) *Calculus Reform and Discrete Mathematics.*
Bill Marion, Valparaiso University (1067-J1-73)

MAA General Contributed Paper Session, XII

8:00 AM – 10:55 AM   **Orleans, 3rd Floor, JW Marriott**

Organizers: **Kristen Meyer**, Wisconsin Lutheran College
Thomas R. Hagedorn, The College of New Jersey

8:00AM ► (1810) *A. Horn's result on matrices with prescribed singular values and eigenvalues.* Preliminary report.
Tin-Yau Tam, Auburn University (1067-Z1-1409)

8:15AM ► (1811) *A range associated with skew symmetric matrix.*
Dawit Gezahegn Tadesse*, **Xuhua Liu** and **Tin-Yau Tam**, Auburn University (1067-Z1-1945)

8:30AM ► (1812) *Examples of Highly Frustrated Matrices.*
Garry S Bowlin, Binghamton University (1067-Z1-1505)

8:45AM (1813) *Multiplicities and generalized numerical range.*
Xuhua Liu, Auburn University (1067-Z1-2248)

9:00AM ► (1814) *Using Mathematica to Teach Linear Differential Operators and the Method of Undetermined Coefficients.*
Itai Seggev, Knox College / Wolfram Research (1067-Z1-2117)

9:15AM ► (1815) *Undetermined Coefficients – Not Just for Constant-Coefficient Equations Anymore.* Preliminary report.
Doreen De Leon, California State University, Fresno (1067-Z1-870)

9:30AM ► (1816) *Imaging Science For Undergraduate Projects Using ODEs and PDEs.*
Emek Kose Can, Loyola Marymount University (1067-Z1-2298)

9:45AM ► (1817) *A Differential Equation Wtih Many Faces.*
Mohammad K. Azarian, University of Evansville (1067-Z1-229)

10:00AM (1818) *Partial Regularity for Parabolic Systems with Subquadratic Growth.* Preliminary report.
Mikil Foss and **Joe Geisbauer***, University of Nebraska-Lincoln (1067-Z1-1744)

10:15AM ► (1819) *Second derivative Adams-type methods for boundary value problems.*
Noureen A. Khan*, University of North Texas Dallas, **Ramanjit Sahi** and **S N Jator**, Austin Peay State University (1067-Z1-464)

10:30AM (1820) *D-Optimal Designs for Models Described by Ordinary Differential Equations.*
Adam F Childers, Roanoke College (1067-Z1-732)

10:45AM (1821) *Classification of Automorphism Groups of Rational Elliptic Surfaces.* Preliminary report.
Tolga Karayayla, University of Pennsylvania (1067-Z1-1879)

SIAM Minisymposium on Vistas in Applied Mathematics

8:00 AM – 10:45 AM   **Bayside A, 4th Floor, Sheraton**

Organizers: **Maria-Carme Calderer**, University of Minnesota
Zuhair Nashed, University of Central Florida

8:00AM ► (1822) *Did Mathematics Cause the Subprime Mortgage Disaster?*
Steven E. Shreve, Carnegie Mellon University (1067-60-1000)

9:00AM ► (1823) *Recent Progress in Sparse Signal Recovery and Processing.*
G Richard Baraniuk, Rice University (1067-41-1817)

10:00AM (1824) *Modeling Fluids with Microstructure.*
Noel J Walkington, Carnegie Mellon University (1067-65-1212)

AWM Workshop

8:00 AM – 4:00 PM   **Mardi Gras E, 3rd Floor, Marriott**

This session has several parts that will be listed separately by time in this program. All presentations are open to all JMM participants.

Organizer: **Cammey Cole Manning**, Meredith College

AWM Workshop: Research Presentations by Recent Ph.D.s, I

8:00 AM – 10:20 AM   **Mardi Gras E, 3rd Floor, Marriott**

Chair: **Rachelle DeCoste**, Wheaton College

8:00AM (1825) *Tensor category of integrable modules over $\mathfrak{sl}_\infty$, $\mathfrak{so}_\infty$, and $\mathfrak{sp}_\infty$.*
Elizabeth Dan-Cohen*, **Ivan Penkov**, Jacobs University Bremen, and **Vera Serganova**, U.C. Berkeley (1067-17-244)

8:30AM (1826) *Prime Ideals in Birational Extensions of Two-Dimensional Power Series Rings.* Preliminary report.
Christina L. Eubanks-Turner*, University of Louisiana at Lafayette, **Serpil Saydam**, University of Louisiana at Monroe, and **Melissa Luckas**, University of Nebraska-Lincoln (1067-13-230)

9:00AM (1827) *Freeness of Arrangement Bundles.*
Amanda C Hager, USMA West Point (1067-55-273)

9:30AM (1828) *Divisibility properties and recursions for the Hilbert series of Macdonald polynomials.*
Elizabeth M Niese* and **Nicholas Loehr**, Virginia Tech (1067-05-227)

10:00AM ▶ (1829) *Fourier-Jacobi coefficients of Eisenstein series on unitary group and the application in Iwasawa main conjecture.*
Bei Zhang, Northwestern University (1067-11-260)

AMS Session on Number Theory, IV

8:15 AM – 10:55 AM   **Napoleon D1, 3rd Floor, Sheraton**

8:15AM ▶ (1830) *Improving Abundancy Bounds.*
Elizabeth McCaslin* and **Fenghao Wang**, McDaniel College (1067-11-2396)

8:30AM ▶ (1831) *On Periodicity of some Fibonacci-like Sequences.*
Trevor E McGuire, Louisiana State University (1067-11-1946)

8:45AM ▶ (1832) *From Fibonacci Numbers to Central Limit Type Theorems.*
Yinghui Wang*, MIT, and **Steven J Miller**, Williams College (1067-11-428)

9:00AM ▶ (1833) *Extensions of Eulerian Numbers to More General Triangular Arrays.*
Hung-ping Tsao, Novato, CA, and **Tingyao Xiong***, Radford University (1067-11-628)

9:15AM (1834) *The distribution of the number of Farey fraction in residue classes.* Preliminary report.
M.Tip E Phaovibul, University of Illinois: Champaign-Urbana (1067-11-2272)

9:30AM ▶ (1835) *Sociable numbers, or How I messed with perfection and lived to write papers about it.*
Paul Pollack, University of Illinois at Urbana-Champaign (1067-11-2101)

9:45AM (1836) *Differential Operators and Weighted Isobaric Polynomials.*
Trueman MacHenry*, York University, Toronto, and **Geanina Tudose**, Bucharest, Romania (1067-11-1145)

10:00AM ▶ (1837) *A Bezoutian algorithm for Egyptian Fractions.* Preliminary report.
Robert Erra, ESIEA - PARIS Equipe SI&S (1067-11-2326)

10:15AM ▶ (1838) *Appending Digits to Generate an Infinite Sequence of Composite Numbers I.*
Lenny Jones, Shippensburg University (1067-11-921)

10:30AM ▶ (1839) *Appending Digits to Generate an Infinite Sequence of Composite Numbers II.* Preliminary report.
Lenny Jones and **Dan White***, Shippensburg University (1067-11-923)

10:45AM ▶ (1840) *Theory and Applications of Benford's Law of Leading Digits.* Preliminary report.
Allison L. Lewis*, University of Portland, **Steven J. Miller**, Williams College, and **Victoria Cuff**, Clemson University (1067-11-1431)

AMS Session on Combinatorics and Graph Theory, VII

8:15 AM – 10:40 AM   **Southdown Room, 4th Floor, Sheraton**

8:15AM ▶ (1841) *Exponential Domination in Grid Graphs.* Preliminary report.
Emily Hale-Sills*, **Kim Lockrow**, **Emily Merrill** and **Samantha Lowe**, Smith College (1067-05-1142)

8:30AM ▶ (1842) *On extremal graphs with a given number of perfect matchings.*
Matthew Price Yancey, University of Illinois at Urbana-Champaign (1067-05-1633)

8:45AM ▶ (1843) *Vertices Belonging to All Maximum Independent Sets.* Preliminary report.
Taylor M Short, Virginia Commonwealth University (1067-05-1652)

9:00AM (1844) *Distances in Kneser Graphs.*
Darin Johnson, Delaware State University (1067-05-2155)

9:15AM (1845) *On Cyclic G-designs, where G is the one-point union of two cycles.*
Christian Pawlak*, Illinois State University, **Krystal Brewington**, **Jessica Lynn Smith**, Morehead State University, and **Stephanie Zeppetello**, Illinois State University (1067-05-2227)

9:30AM ▶ (1846) *Minimum P_k-total weights of graphs.* Preliminary report.
Ji Young Choi, Shippensburg University / DIMACS, Rutgers University (1067-05-2294)

9:45AM ▶ (1847) *Reconstruction of graphs from metric balls of their vertices.*
Andrew B Ray, University of Nebraska - Lincoln (1067-05-1632)

10:00AM *Hyperspace Graph of Connected*
► (1848) *Subgraphs.*
Likin C. Simon Romero, Rochester
Institute of Technology (1067-05-1555)

10:15AM *Longest Cycles in k-connected Graphs*
(1849) *with Given Independence Number.*
Suil O*, **Douglas B. West** and
Hehui Wu, University of Illinois at
Urbana-Champaign (1067-05-420)

10:30AM *Paths as m-step Competition Graphs.*
(1850) **Eva K. Belmont**, Harvard University
(1067-05-359)

MAA General Contributed Paper Session, XI

8:15 AM – 10:55 AM   St. Claude, 3rd
                                   Floor, JW Marriott

Organizers: **Kristen Meyer**, Wisconsin
Lutheran College

Thomas R. Hagedorn, The
College of New Jersey

8:15AM *Sugar Ditch Revisited.* Preliminary report.
► (1851) **Leslie M. Horton**, Delta State University
(1067-Z1-2257)

8:30AM *Concept Maps: What are they and what*
► (1852) *can we learn from them about students'*
understanding of mathematics?
Rebecca C Metcalf, Bridgewater State
University (1067-Z1-2063)

8:45AM *Classifying Students by Conceptual*
► (1853) *Understanding in Real-Time.*
Andrew J Cousino, Kansas State
University (1067-Z1-2123)

9:00AM *Designing a parenting seminar to*
(1854) *address the national shortage of*
mathematicians.
Jessica M Mikhaylov*, US Military
Academy, West Point, Center for
Leadership and Diversity in STEM, and
Nancy S Libertini, The Tidewater School,
Huntingtown, Maryland (1067-Z1-2081)

9:15AM *Report on the NSF PRISM project at*
► (1855) *Truman State University.* Preliminary
report.
Jason E Miller, Truman State University
(1067-Z1-1754)

9:30AM *Bridging Policy and Practice with*
► (1856) *Ethnomathematics.*
Linda Furuto, University of Hawai'i -
West O'ahu (1067-Z1-17)

9:45AM *Mathematics Performance of Boys*
► (1857) *Correlates with Gender Equity.*
Jonathan Kane, University of Wisconsin –
Whitewater, and **Janet Mertz***, University
of Wisconsin – Madison (1067-Z1-931)

10:00AM *Language, Gender, and Number.*
► (1858) **Rebecca Boone**, retired (from UCB as an
ediorial assistant for Science Magazine)
(1067-Z1-867)

10:15AM *Math Mistakes in the Media.* Preliminary
► (1859) report.
Heather A. Lewis, Nazareth College
(Rochester, NY) (1067-Z1-2122)

10:30AM *Let's Read the News.*
► (1860) **Leonard J Lipkin**, University of North
Florida (1067-Z1-2308)

10:45AM *Teaching Basic Number Theory from the*
► (1861) *Sieve of Eratosthenes.*
Jacqueline Anderson Hall, Longwood
University (1067-Z1-1271)

AMS Session on Partial Differential Equations, III

8:30 AM – 10:55 AM   Balcony N, 4th Floor, Marriott

8:30AM *Global regularity results for the 2D*
(1862) *Boussinesq equations with vertical*
dissipation. Preliminary report.
Dhanapati Adhikari*, Oklahoma
State University, **Chongsheng Cao**,
Florida International University, and
Jiahong Wu, Oklahoma State University
(1067-35-1840)

8:45AM *The axiomatic approach to Harnack's*
(1863) *inequality in doubling quasi-metric*
spaces. Preliminary report.
Sharad D Silwal*, **Sapto Indratno** and
Diego Maldonado, Kansas State
University (1067-35-2242)

9:00AM *A Sensitivity Analysis for Partial*
(1864) *Differential Equations with Applications.*
Faranak Pahlevani, Penn State Abington
(1067-35-1458)

9:15AM *Semilinear wave equations with*
(1865) *non-monotone nonlinearity.*
Alfonso Castro, Harvey Mudd College
(1067-35-388)

9:30AM *Regularity of n/2-harmonic maps into*
(1866) *spheres.*
Armin Schikorra, RWTH Aachen,
Germany (1067-35-57)

9:45AM *Edge-Enhancing Speckle Denoising for*
► (1867) *Ultrasound Images.*
John R Corring*, University of Southern
Mississippi, **Helene Duke**, Providence
College, **Arundhati Bagchi Misra** and
Hyeona Lim, Mississippi State University
(1067-00-1687)

10:00AM *Wave-breaking for a generalized*
(1868) *two-component Camassa-Holm system.*
Robin Ming Chen, University of
Minnesota (1067-35-1783)

10:15AM *Blow up Solution for Complex-valued*
► (1869) *Burgers Equation.*
Netra Prakash Khanal, The University of
Tampa (1067-35-1417)

10:30AM *A nonlinear free boundary problem in*
► (1870) *gas dynamics.*
Michael T. Heitzman* and **Carmen
Chicone**, University of Missouri
(1067-35-2009)

10:45AM *Universality of Fibonacci Patterns.*
► (1871) **Patrick D Shipman**, Colorado State
University,, **Zhiying Sun***, University of
California, Irvine, **Alan C Newell** and
Pennybacker F Mattew, University of
Arizona (1067-35-481)

AMS Committee on Education Panel Discussion

8:30 AM – 10:00 AM   **Balcony M, 4th Floor, Marriott**

Teaching elementary math is not elementary: How mathematicians can help, and why?

Moderator: **Lawrence F. Gray**, University of Minnesota

Panelists: **Johnette Roberts**, City of Baker School System

Kristin Umland, University of New Mexico

Hyman Bass, University of Michigan, Ann Arbor

Kenneth I. Gross, University of Vermont

AMS Session on Functional Analysis

8:45 AM – 10:55 AM   **Balcony L, 4th Floor, Marriott**

8:45AM *Unconditional convergence in the strong*
(1872) *operator topology and ℓ_∞.* Preliminary report.
Ioana Ghenciu*, University of Wisconsin-River Falls, and **Paul Lewis**, University of North Texas (1067-46-202)

9:00AM *Real one-sided M-ideals.* Preliminary
(1873) report.
Sonia Sharma, University of Houston (1067-46-281)

9:15AM *On non-associative L_p-spaces associated*
(1874) *with Maharam traces on JBW-algebras.*
Alexander A. Katz, St. John's University, NY, USA (1067-46-353)

9:30AM *Extreme points and isometries on*
(1875) *vector-valued Lipschitz spaces.*
Fernanda Botelho, University of Memphis, **Richard J. Fleming***, Central Michigan University, and **James E. Jamison**, University of Memphis (1067-46-1015)

9:45AM *Operators on the $\mathcal{L}_\infty$ spaces of Bourgain*
(1876) *and Delbaen.*
Lon H Mitchell, Virginia Commonwealth University (1067-46-1285)

10:00AM *Embedding Banach spaces into spaces*
(1877) *with very few operators.* Preliminary report.
S. Argyros, National Technical University of Athens, **D. Freeman***, University of Texas, **R. Haydon**, University of Oxford, **E. Odell**, University of Texas, **Th. Raikoftsalis**, National Technical University of Athens, **Th. Schlumprecht**, Texas A&M University, and **D. Zisimopoulou**, National Technical University of Athens (1067-46-2196)

10:15AM *Strictly singular operators between*
(1878) *separable Banach spaces.*
Kevin James Beanland, Virginia Commonwealth University (1067-46-2288)

10:30AM *Graph Algebras, Aperiodicity, and*
(1879) *Condition (F).* Preliminary report.
Sarah E. Wright, College of the Holy Cross (1067-46-2304)

10:45AM *The Schur-Horn Theorem for Operators*
(1880) *with Three Point Spectrum.*
John D Jasper, University of Oregon (1067-46-2424)

AMS Colloquium Lectures: Lecture III

8:50 AM – 9:50 AM   **Great Ballroom A-C, 5th Floor, Sheraton**

(1881) *Expander graphs in pure and applied mathematics, III.*
Alexander Lubotzky, The Hebrew University of Jerusalem (1067-51-15)

ASL Invited Address

9:00 AM – 9:50 AM   **Bayside C, 4th Floor, Sheraton**

(1882) *O-minimality and Hilbert's 16th problem.*
Patrick Speissegger, McMaster University (1067-03-66)

MAA Invited Paper Session on The Intersection of Graphs and Geometry, I

9:00 AM – 10:55 AM   **Rhythms II and III, 2nd Floor, Sheraton**

Organizer: **Edward Scheinerman**, Johns Hopkins University

9:00AM *The Genus of a Digital Image*
(1883) *is Determined by its Foreground, Background, and Reeb Graphs.*
Donniell Fishkind*, Johns Hopkins University, **Lowell Abrams**, George Washington University, and **Carey Priebe**, Johns Hopkins University (1067-AF-1469)

9:30AM *Tolerance Graphs.*
(1884) **Ann N. Trenk**, Wellesley College (1067-AF-1534)

10:00AM *Geometric Drawings of Graphs Using Few*
(1885) *Edge Lengths.* Preliminary report.
Dan Archdeacon, University of Vermont (1067-AF-1483)

10:30AM *Lombardi drawings: an artist-inspired*
(1886) *approach to drawing graphs.*
Christian A. Duncan*, Louisiana Tech University, **David Eppstein**, **Michael T. Goodrich**, University of California Irvine, **Stephen G. Kobourov**, University of Arizona, and **Martin Nöllenburg**, Institute of Theoretical Informatics (1067-AF-1532)

MAA Minicourse #12: Part B

9:00 AM – 11:00 AM   Ile de France III,
                            3rd Floor, JW Marriott

Concepts, data, and models: College algebra for the real world.
Organizers: **Sheldon P. Gordon**, Farmingdale State College
Florence S. Gordon, New York Institute of Technology

MAA Minicourse #3: Part B

9:00 AM – 11:00 AM   Ile de France I,
                            3rd Floor, JW Marriott

Geometry and algebra in mathematical music theory.
Organizers: **Thomas M. Fiore**, Univeristy of Michigan-Dearborn
Dmitri Tymoczko, Department of Music, Princeton University
Robert Peck, School of Music, Louisiana State University

MAA Minicourse #6: Part B

9:00 AM – 11:00 AM   Ile de France II,
                            3rd Floor, JW Marriott

Green linear optimization.
Organizer: **Glenn H. Hurlbert**, Arizona State University

MAA Committee on Graduate Students-Young Mathematicians' Network Panel Discussion

9:00 AM – 10:20 AM   Mardi Gras D,
                            3rd Floor, Marriott

Maximize your career potential!
Organizers: **Rachel Esselstein**, California State University Monterey Bay
David Manderscheid, University of Nebraska-Lincoln
Speakers: **Geir Helleloid**, Acuitus Inc.
Aba Mbrika, Bowdoin College

MAA Committee on Technology in Math Education Panel Discussion

9:00 AM – 10:20 AM   La Galerie 2,
                            2nd Floor, Marriott

Publishing mathematics on the Web.
Organizer: **Thomas E. Leathrum**, Jacksonville State University
Panelists: **Lawrence Moore**, Duke University

Robert Miner, Design Science, Inc.
Thomas E. Leathrum
David Ruddy, Project Euclid/Cornell University

SIGMAA on Math Circles for Students and Teachers Special Presentation

9:00 AM – 11:00 AM   Great Ballroom
                            E, 5th Floor, Sheraton

Math Circles demonstration.
Presenter: **James Tanton**, St. Mark's Institute of Mathematics

NAM Panel Discussion

9:00 AM – 9:50 AM   Oak Alley Room,
                            4th Floor, Sheraton

NAM honors the life of Dr. David Harold Blackwell.

Exhibits and Book Sales

9:00 AM – NOON   Grand Ballroom,
                           3rd Floor, Marriott

Employment Center

9:00 AM – NOON   Preservation Hall,
                           2nd Floor, Marriott

Student Hospitality Center

9:00 AM – 2:00 PM   Gallier Room,
                            4th Floor, Sheraton

AMS Session on Calculus of Variations, Optimal Control, and Optimization

9:15 AM – 10:55 AM   La Galerie 1,
                            2nd Floor, Marriott

9:15AM *Isoperimetric Problems with Density.*
(1887) Preliminary report.
        Frank Morgan, Williams College and Fields Institute (1067-49-398)

9:30AM *Existence of surface energy minimizing*
(1888) *partitions of space satisfying volume constraints and having independent surface energy density functions.*
        David George Caraballo, Georgetown University (1067-49-662)

9:45AM *The Minimum Speed for a Blocking*
▶ (1889) *Problem on the Half Plane.*
        Tao Wang* and **Alberto Bressan**, Pennsylvania State University (1067-49-1323)

10:00AM *Modeling complex physical phenomena*
▶ (1890) *using energy minimization principle.*
        Preliminary report.
        Robert D Hill, George Mason University (1067-49-1327)

10:15AM *Synthesis of two-dimensional*
(1891) *electromagnetic media that achieve desired transfer functions.*
Harish Subrahmanya Bhat, University of California, Merced (1067-49-2395)

10:30AM *Identification of nodes in a network: a*
▶ (1892) *discrete analogue of optical tomography.*
Bonnie Jacob, National Technical Institute for the Deaf (1067-49-2124)

10:45AM *Modeling optimal age-specific vaccination*
▶ (1893) *strategies against pandemic influenza.* Preliminary report.
Sunmi Lee, Mathematical and Computational Modeling Sciences Center, Arizona State University (1067-49-569)

ASL Invited Address

10:00 AM – 10:50 AM   **Bayside C,
4th Floor, Sheraton**

(1894) *Ordered groups definable in o-minimal theories.*
Alf Onshuus, University of Los Andes (1067-03-65)

NAM Business Meeting

10:00 AM – 10:50 AM   **Oak Alley Room,
4th Floor, Sheraton**

MAA Invited Address

10:05 AM – 10:55 AM   **Great Ballroom
A-C, 5th Floor, Sheraton**

(1895) *Lessons from the Netflix Prize.*
Robert M. Bell, AT&T (1067-A0-35)

AWM Workshop: Poster Session with Presentations from Women Graduate Students

10:30 AM – 11:00 AM   **Mardi Gras E,
3rd Floor, Marriott**

10:30AM *Zero Cycles of Degree One on Principal*
(1896) *Homogeneous Spaces.*
Jodi A. Black, Emory University (1067-11-210)

10:30AM *Algebraic model structures.*
(1897) **Emily Riehl**, University of Chicago (1067-18-228)

10:30AM *Long Time Behavior of radially symmetric*
▶ (1898) *solutions of higher dimensional Kuramoto-Sivashinsky Equation.*
Aslihan Demirkaya, University of Kansas (1067-37-249)

10:30AM *Title: Conjugacy Classes of σ-stable*
(1899) *Maximal k-split Tori.* Preliminary report.
Catherine Andrea Buell, North Carolina State University (1067-20-256)

10:30AM *A Generalization of Turaev's Virtual*
(1900) *String Cobracket and the Homotopy Rank of a Virtual String.* Preliminary report.
Patricia R Cahn, Dartmouth College (1067-57-258)

10:30AM *A Finite Element Approach to C^{β}*
(1901) *Extension using Prefractals.*
Emily J Evans, Worcester Polytechnic Institute (1067-35-259)

10:30AM *An example of computing local*
(1902) *cohomology.*
Emily E. Witt, University of Michigan (1067-13-266)

10:30AM *A counterexample related to*
(1903) *Muckenhoupt-Wheeden conjecture.*
Maria Carmen Reguera, Georgia Institute of Technology (1067-43-271)

10:30AM *Calculus of Functors.* Preliminary report.
(1904) **Rosona M Eldred**, University of Illinois at Urbana-Champaign (1067-18-285)

10:30AM *Modeling of Intracranial Aneurysms*
▶ (1905) *using Immersed Boundary Methods.* Preliminary report.
Lisa Melanson, Northwestern University (1067-76-289)

10:30AM *Characterizations of Projective Spaces*
(1906) *and Smooth Quadric Hypersurfaces via $\wedge^{p} T_X$.*
Kiana L. Ross, University of Washington (1067-14-290)

10:30AM *Cluster Analysis of Data on Finite Groups*
(1907) *and Homogeneous Spaces.* Preliminary report.
Paige E. Rinker, Dartmouth College (1067-08-326)

MAA Business Meeting

11:10 AM – 11:40 AM   **Great Ballroom
A-C, 5th Floor, Sheraton**

Chair: **David Bressoud**, Macalester College

AMS Business Meeting

11:45 AM – 12:15 PM   **Great Ballroom
A-C, 5th Floor, Sheraton**

NAM Claytor-Woodard Lecture

1:00 PM – 1:50 PM   **Oak Alley Room,
4th Floor, Sheraton**

▶ (1908) *Galois Representations and L-Series: A Tour Through Mathematics.*
Edray Herber Goins, Purdue University (1067-11-2267)

AMS-MAA Special Session on Centers for Teaching/Education/Outreach in Departments of Mathematics

1:00 PM – 5:50 PM **La Galerie 6, 2nd Floor, Marriott**

Organizer: **Michael E. Mays**, West Virginia University

1:00PM *The Institute for Mathematics and Education.*
▶ (1909) **Joceline Lega**, University of Arizona (1067-00-1972)

1:30PM *The UNL Center for Science, Mathematics and Computer Education.* Preliminary report.
▶ (1910) **W James Lewis**, University of Nebraska-Lincoln (1067-97-1742)

2:00PM *Quantitative Education as Applied Mathematics.*
▶ (1911) **Andrew G Bennett**, Kansas State University (1067-97-1823)

2:30PM *University of Wyoming Science and Mathematics Teaching Center: Report on Mathematics Teaching, Education, and Outreach through a joint unit of College of Arts and Sciences and College of Education.* Preliminary report.
▶ (1912) **Robert Lee Mayes**, University of Wyoming (1067-97-645)

3:00PM *New Goals and Associated Changes at the Mathematics and Science Teaching (MAST) Institute at the University of Northern Colorado (UNC).*
(1913) **Steven William Anderson**, MAST Institute, The University of Northen Colorado (1067-97-755)

3:30PM *The Center for Leadership and Diversity in STEM (Science, Technology, Engineering, and Mathematics) at West Point.*
▶ (1914) **Donald A Outing*** and **Archie Wilmer**, West Point (1067-97-2157)

4:00PM *GMU COMPLETE: Center for Outreach in Mathematics Professional Learning and Educational Technology.* Preliminary report.
▶ (1915) **Padmanabhan Seshaiyer*** and **Jennifer Suh**, George Mason University (1067-97-152)

4:30PM *How the Mathematics Department Supports the UTeach Program in the College of Natural Sciences at the University of Texas at Austin.*
(1916) **Mark L. Daniels*** and **Efraim P. Armendariz**, University of Texas at Austin (1067-97-81)

5:00PM *The Texas Leadership Initiative and Texas LIMIT Projects: Training the Trainers.* Preliminary report.
▶ (1917) **Thomas W Judson***, **Lesa L Beverly** and **Kimberly M Childs**, Stephen F. Austin State University (1067-97-1166)

5:30PM *WRAP - The Worthing Rice Apprenticeship in Computational Neuroscience.*
▶ (1918) **Steven J. Cox***, Rice University, **Jessica C Joyce**, Bioengineering, Rice University, **Kathryn Ward** and **Jay Raol**, Rice University (1067-97-58)

AMS-SIAM Special Session on Control and Inverse Problems for Partial Differential Equations, II

1:00 PM – 5:50 PM **Napoleon D2, 3rd Floor, Sheraton**

Organizers: **Ana-Maria Croicu**, Kennesaw State University
Michele L. Joyner, Kennesaw State University

1:00PM *A Dynamical Inverse Problem on a Metric Graph.*
(1919) **John Matthews***, **Boris P. Belinskiy**, University of Tennessee at Chattanooga, and **Sergei A Avdonin**, University of Alaska Fairbanks (1067-35-599)

1:30PM *Hydraulic Conductivity Inverse Formulation for the Groundwater Flow Problem with Variable Density.*
(1920) **Yanzhao Cao**, Auburn University (1067-65-834)

2:00PM *An efficient and robust numerical algorithm for estimating parameters in Turing systems.*
(1921) **Marcus R. Garvie**, University of Guelph, **Philip K. Maini**, Centre for Mathematical Biology, Mathematical Institute, and **Catalin Trenchea***, University of Pittsburgh (1067-49-1480)

2:30PM *Target Tracking Strategies for a Nonlinear Aircraft Model.*
(1922) **Animesh Chakravarthy**, University of Florida, **Katie A Evans**, Louisiana Tech University, **Johnny Evers**, Air Force Research Laboratory, Munitions Directorate, and **Lisa M Kuhn***, Louisiana Tech University (1067-49-2309)

3:00PM *HIV Model Analysis, State Estimation and Optimal Control.*
▶ (1923) **John A. David**, The College of Wooster (1067-49-575)

3:30PM *Optimal control of a spatio-temporal epidemic model.*
▶ (1924) **Suzanne Lenhart***, University of Tennessee, and **Rachael Miller Neilan**, Louisiana State University (1067-49-945)

4:00PM *Optimization Strategy for Single and Dual Resistance of Antibiotics in Hospitals.* Preliminary report.
(1925) **Michele L Joyner**, East Tennessee State University (1067-49-1915)

4:30PM *Adaptive Tracking and Estimation for Nonlinear Control Systems.*
(1926) **Frederic Mazenc**, Projet INRIA DISCO, **Michael Malisoff*** and **Marcio de Queiroz**, Louisiana State University (1067-93-515)

5:00PM *Effect of random perturbations on*
(1927) *adaptive observation techniques.*
Jakir Hossen, Dhakka, Bangaladesh,
Ionel Michael Navon*, Florida State
University, and **Dacian N Daescu**,
Fariborz Maseeh Department of
Mathematics and Statistics, Portland
State University (1067-49-1280)

5:30PM *A dual weighted trust-region adaptive*
(1928) *POD 4D-Var applied to a Finite-Volume*
global shallow-water Equations Model in
Sphere.
Xiao Chen*, Florida State University,
Santha Akella, Department of Earth and
Planetary Sciences, Johns Hopkins
University, and **Ionel Michael Navon**,
Department of Scientific Computing,
Florida State University (1067-49-209)

AMS Special Session on Asymptotic Methods in Analysis with Applications, II

1:00 PM – 5:50 PM   Borgne Room,
                                  3rd Floor, Sheraton

Organizers: **Diego Dominici**, State
University of New York at
New Paltz
Peter A. McCoy, U.S. Naval
Academy

1:00PM *Application of special functions to*
(1929) *disparate fields.* Preliminary report.
Roger W. Barnard, Texas Tech
University, Lubbock, TX (1067-33-1032)

1:30PM *Asymptotic p-adic methods.*
(1930) **Erin Beyerstedt**, **Victor H. Moll**, Tulane
University, and **Xinyu Sun***, Xavier
University of Louisiana (1067-33-2233)

2:00PM *Character analogues of Ramanujan*
(1931) *type integrals involving the Riemann*
Ξ*-function.*
Atul Abhay Dixit, University of Illinois at
Urbana-Champaign (1067-11-597)

2:30PM *An effective asymptotic formula for the*
(1932) *Stieltjes constants.*
Mark W. Coffey, Colorado School of
Mines (1067-30-1085)

3:00PM *Asymptotics and Zeros for Partition*
(1933) *Statistics Polynomials.* Preliminary report.
Robert P. Boyer*, Drexel University,
William M. Y. Goh, Department of
Statistics and Finance, University of
Science and Technology of China, and
Daniel T. Parry, Drexel University
(1067-11-946)

3:30PM *Asymptotic analysis of the linearized*
(1934) *Navier-Stokes equations in a general*
domain.
Gung-Min Gie*, University of California,
Riverside, **Makram Hamouda** and
Roger Temam, Institute for Scientific
Computing and Applied Mathematics,
Indiana University (1067-35-511)

4:00PM *The Diffusion Phenomenon and Decay*
(1935) *Rates for Hyperbolic Equations with*
Damping.
Petronela Radu*, University of
Nebraska-Lincoln, **Grozdena Todorova**
and **Borislav Yordanov**, University of
Tennessee-Knoxville (1067-35-82)

4:30PM *Asymptotic Models of the Nonlinear*
(1936) *Adaptive Orthotropic Elastic Rod and*
Plate.
Robert J Ronkese, United States Military
Academy at West Point (1067-74-1549)

5:00PM *Asymptotic Laplace Transforms and*
(1937) *Watson's Lemma .*
Claudiu Mihai, Daemen College
(1067-44-2252)

5:30PM *Asymptotic Expansions Of Solutions Of*
(1938) *An Inhomogeneous Equation.*
Xinfu Chen and **Susmita Sadhu***,
University Of Pittsburgh (1067-34-2156)

AMS Special Session on Applied Optimization and Douglas-Rachford Splitting Methods for Convex Programming

1:00 PM – 5:45 PM   Frontenac, 3rd
                                   Floor, JW Marriott

Organizer: **Ram U. Verma**, Seminole
State College of Florida

1:00PM *Douglas-Ratchford iterations in the*
(1939) *absence of convexity.*
Jonathan M Borwein* and **Brailey Sims**,
CARMA, University of Newcastle NSW
Australia (1067-49-224)

2:00PM *Generalized Invexity and Higher Order*
(1940) *Duality for Variational Problems.*
R N Mohapatra, University of Central
Florida (1067-90-1013)

3:00PM *Second Order Necessary Conditions in*
(1941) *Scalar Nonsmooth Set Constrained*
Optimization.
Elena Constantin, University of
Pittsburgh at Johnstown (1067-49-347)

3:30PM *Optimality Conditions in Semi-Infinite*
(1942) *and Infinite Programming.*
Boris Mordukhovich and **Nghia Tran***,
Wayne State University (1067-49-568)

4:00PM *On Solutions for Fractional-order*
► (1943) *Functional Integrodifferential Equations*
with Infinite Delay. Preliminary report.
Haewon Lee* and **Peter**
Frempong-Mireku, Dillard University
(1067-45-2345)

4:30PM *Applications of Nonsmooth Optimization*
(1944) *to a Generalized Fermat-Torricelli*
Problem.
Boris Mordukhovich, Wayne State
University, and **Nguyen Mau Nam***,
University of Texas-Pan American
(1067-49-684)

5:00PM (1945) ▶ *Relatively Relaxed Proximal Point Algorithms for Generalized Maximal Monotone Mappings and Douglas-Rachford Splittings.* Preliminary report.
Ram U Verma, Texas A&M Universitty - Kingsville (1067-49-697)

AMS Special Session on Stochastic, Fractional, and Hybrid Dynamic Systems with Applications

1:00 PM – 5:50 PM   Conde, 3rd Floor, JW Marriott

Organizers: **A. S. Vatsala**, University of Louisiana at Lafayette
G. S. Ladde, University of South Florida

1:00PM (1946) *Uniqueness and parameter dependence of positive solutions for systems of fractional boundary value problems.*
John R. Graef*, **Lingju Kong**, The University of Tennessee at Chattanooga, and **Qingkai Kong**, Northern Illinois University (1067-34-940)

1:30PM (1947) *Fractional Differential Equations:Stochastic Modeling, Methods and Analysis.* Preliminary report.
Jean-Claude Pedjeu* and **Gangaram S Ladde**, University of South Florida (1067-60-1006)

2:00PM (1948) *Existence of coupled minimal and maximal solutions of Fractional Periodic Boundary Value Problem via Initial Value Problem.* Preliminary report.
J. Diego Ramirez* and **Aghalaya S. Vatsala**, University of Louisiana at Lafayette (1067-34-751)

2:30PM (1949) *Option Pricing for Hybrid Nonlinear Stochastic Models.* Preliminary report.
Ling Wu* and **Gangaram S Ladde**, University of South Florida (1067-60-1023)

3:00PM (1950) *Monotone Iterative Technique for Finite Systems of Nonlinear Fractional Differential Equations.* Preliminary report.
Zachary Denton* and **Aghalaya Vatsala**, University of Louisiana at Lafayette (1067-34-779)

3:30PM (1951) *Stochastic Stability of Two-scale Network Dynamic Epidemic Model.* Preliminary report.
Divine T Wanduku* and **Gangaram S Ladde**, University of South Florida (1067-60-1026)

4:00PM (1952) *A system of Stochastic Difference Equations Modeling Terrorism.* Preliminary report.
Jairo Santanilla, University of New Orleans (1067-39-2089)

4:30PM (1953) *Stochastic Hybrid Dynamic Model for Risk Process.* Preliminary report.
Daniel Siu* and **Gangaram S Ladde**, University of South Florida (1067-60-1328)

5:00PM (1954) *Some Results for Partial Fractional Differential Inequalities.*
Donna Sue Stutson, Xavier University of Louisiana (1067-34-1902)

5:30PM (1955) *Existence of Coupled Extremal Solutions for Nonlinear Caputo Fractional Reaction Diffusion Equations.* Preliminary report.
Aghalaya S. Vatsala, Louisiana State University, Lafayette (1067-35-1188)

AMS-SIAM Special Session on Applications of Stochastic Processes in Neuroscience, II

1:00 PM – 5:45 PM   La Galerie 5, 2nd Floor, Marriott

Organizers: **Peter Thomas**, Case Western Reserve University
Kreso Josic, University of Houston
Carson C. Chow, Institutes of Health

1:00PM (1956) *Stochastic Operating Point for the Dynamics of the Primary Visual Cortex.*
David Cai, Courant Institute/Center for Neural Science, New York Univ. & Institute of Natural Sciences, Shanghai Jiao Tong Univ. (1067-92-761)

2:00PM (1957) *Finite-size effects in globally coupled neural networks.*
Carson C Chow* and **Michael A Buice**, NIH (1067-92-771)

2:30PM (1958) *Heterogeneity and Stability in globally coupled neural networks.*
Michael A Buice* and **Carson C Chow**, NIH (1067-92-774)

3:00PM (1959) ▶ *Gamma-generating networks with inhibitory cells that do not participate in the rhythm.* Preliminary report.
Christoph Borgers, Tufts University (1067-92-500)

3:30PM (1960) *Mechanisms that modulate the transfer of spiking correlations.*
Kresimir Josic*, **Robert Rosenbaum** and **James Trousdale**, University of Houston (1067-92-824)

4:00PM (1961) *Estimation of information measures in coupled diffusion neuronal models.*
Maria Teresa Giraudo*, **Laura Sacerdote**, **Roberta Sirovich** and **Cristina Zucca**, University of Torino, Italy (1067-60-722)

4:30PM (1962) *Modeling the stochastic dynamics of localized calcium elevations and whole cell calcium responses.*
Marco A Huertas, Neuroscience Center for Excellence, Louisiana State University Health Science Center, New Orleans, Louisiana, and **Gregory Douglas Smith***, Department of Applied Science, The College of William and Mary, Williamsburg, Virginia (1067-92-48)

5:00PM *Random dynamical systems and an*
(1963) *application to self-organized criticality in*
neural data.
Manfred Denker, Pennsylvania State
University (1067-92-276)

AMS Special Session on Analysis of Reaction-Diffusion Models, II

1:00 PM – 5:50 PM   **Napoleon C3,**
3rd Floor, Sheraton

Organizers: **Junping Shi**, College of
William and Mary
Xuefeng Wang, Tulane
University

1:00PM *Symmetry of Solutions for Nonlinear*
(1964) *Integral and PDE Systems.*
Wenxiong Chen*, Yeshiva University,
and **Congming Li**, University of Colorado
at Boulder (1067-35-1130)

1:30PM *Positive solutions to nxn elliptic systems*
(1965) *with combined nonlinear effects.*
Jaffar Ali, Florida Gulf Coast University,
Ken Brown, Heriot-Watt University, UK,
and **Ratnasingham Shivaji***, Mississippi
State University (1067-35-747)

2:00PM *Cross-diffusion induced Turing instability*
► (1966) *for a three species food chain model.*
Preliminary report.
Zhifu Xie, Virginia State University
(1067-35-851)

2:30PM *Blow-up for A Parabolic System with*
(1967) *Nonlinear Memory.*
Keng Deng* and **Zhihua Dong**,
University of Louisiana at Lafayette
(1067-35-1317)

3:00PM *Blow-up properties for a semilinear*
(1968) *reaction-diffusion system.* Preliminary
report.
Tor A. Kwembe and **Zhenbu Zhang***,
Jackson State University (1067-35-1264)

3:30PM *Lifespans for Effective Boundary*
(1969) *Conditions.*
Cody Pond, Tulane University
(1067-35-1129)

4:00PM *On finding multiple solutions to a*
(1970) *singularly perturbed Neumann problem.*
Jianxin Zhou*, Texas A&M University,
Ziqing Xie and **Yongjun Yuan**, Hunan
Normal University (1067-35-548)

4:30PM *Spiky steady states of chemotaxis*
► (1971) *systems via global bifurcation and*
Helly's compactness theorem. Preliminary
report.
Qian Xu, Capital Normal University,
Xuefeng Wang*, Tulane University, and
Yaping Wu, Capital Normal University
(1067-35-1377)

5:00PM *Structure of Principal Eigenvectors and*
► (1972) *Genetic Diversity.*
Peter W Bates, Michigan State University,
Fengxin Chen*, University of Texas at
San Antonio, and **Richard Lenski**,
Michigan State University (1067-35-1098)

5:30PM *Uniqueness of positive solution to*
(1973) *semilinear elliptic systems.*
Jann-Long Chern, National Central
University, **Chang-Shou Lin**, Taiwan
University, **Junping Shi***, College
of William and Mary, and **Yong-Li
Tang**, National Central University
(1067-35-1627)

AMS Special Session on Continued Fractions, II

1:00 PM – 5:45 PM   **Napoleon D3,**
3rd Floor, Sheraton

Organizers: **James G. McLaughlin**, West
Cester University
Nancy J. Wyshinski, Trinity
College

1:00PM *Generalizing Stern's Diatomic Sequences*
► (1974) *via Multi-dimensional Continued*
Fractions. Preliminary report.
Thomas Garrity, Williams
(1067-11-1907)

2:00PM *A Statistical Look at the Gauss-Kuzmin*
► (1975) *Distribution.* Preliminary report.
Steven E Duff* and **Nathan C Ryan**,
Bucknell University (1067-11-158)

2:30PM *Modular identities involving powers of*
► (1976) *the Rogers-Ramanujan functions.*
Chadwick Gugg, Georgia Southwestern
State University (1067-11-2110)

3:00PM *Certain Properties of the*
► (1977) *Ramanujan-Göllnitz-Gordon Continued*
Fraction.
Boonrod Yuttanan, University of Illinois
at Urbana-Champaign (1067-11-430)

3:30PM *Weighted divisor sums and Bessel*
(1978) *function series.*
Bruce C. Berndt, University of Illinois
at Urbana-Champaign, **Sun Kim***,
Pennsylvania State University, and
Alexandru Zaharescu, University of
Illinois at Urbana-Champaign
(1067-11-716)

4:00PM *Classification and Symmetries of a*
(1979) *Family of Continued Fractions With*
Bounded Period Length.
Renate Scheidler*, Unversity of Calgary,
Canada, **Kell H. F. Cheng**, Hong Kong
Institute of Education, **Richard K. Guy**
and **Hugh C. Williams**, University of
Calgary, Canada (1067-11-331)

4:30PM *Continued Fraction Proofs of*
(1980) *m-versions of Some Identities of*
Rogers-Ramanujan-Slater Type.
Douglas Bowman, Northern Illinois
University, **James G Mc Laughlin***,
West Chester University, and **Nancy
Wyshinski**, Trinity College, Hartford, CT
(1067-33-588)

5:00PM *Harmonic Continued Fractions.*
(1981) Preliminary report.
Douglas C Bowman, Northern Illinois
University (1067-11-2421)

AMS Special Session on Noncommutative Harmonic Analysis and Dynamic Systems, II

1:00 PM – 5:50 PM   Napoleon B3, 3rd Floor, Sheraton

Organizers: **Tao Mei**, Wayne State Unviersity

           Alan D. Wiggins, University of Michigan at Dearborn

1:00PM (1982)   *Weak and strong weighted norm of any Calderon–Zygmund operator are equivalent.*
Alexander L Volberg, Michigan State University (1067-35-479)

1:30PM (1983)   *Non commutative diffusion semigroups.* Preliminary report.
Marius Junge*, UNiversity of Illinois, **Eric Ricard**, Besancon, France, and **Dimar Shlyahktenko**, UCLA (1067-46-1347)

2:00PM (1984)   *A Hilbert module approach to certain group properties.*
Zhe Dong, Zhejiang University, and **Zhong-Jin Ruan***, University of Illinois at Urbana-Champaign (1067-46-785)

2:30PM (1985)   *Schur multipliers of Calderon-Zygmund type.*
Javier Parcet, Instituto de Ciencias Matematicas, Madrid (1067-42-494)

3:00PM (1986)   *Beurling-Fourier algebras of compact groups.*
Nico Spronk, University of Waterloo (1067-43-745)

3:30PM (1987)   *Von Neumann algebras with unique Cartan subalgebras.*
Ionut Chifan, Vanderbilt University (1067-47-1262)

4:00PM (1988)   *Hardy spaces associated with semigroups of operators.*
Steve Avsec, University of Illinois Urbana-Champaign (1067-46-2042)

4:30PM (1989)   *A non-commutative Path Space approach to stationary free Stochastic Differential Equations.*
Yoann N. Dabrowski, University of California, Los Angeles (1067-46-610)

5:00PM (1990)   *Rigidity Results for Ergodic Actions of Wreath Product Groups.*
J. Owen Sizemore, UCLA (1067-46-927)

5:30PM (1991)   *A family of non-cocycle conjugate E_0-semigroups obtained from boundary weight doubles.*
Christopher Jankowski, Ben-Gurion University of the Negev (1067-46-560)

AMS Special Session on Combinatorial Algebraic Geometry, II

1:00 PM – 5:50 PM   Napoleon B2, 3rd Floor, Sheraton

Organizers: **Frank Sottile**, Texas A&M University

           Alexander T. Yong, University of Illinois, Urbana-Champaign

1:00PM (1992)   *An Implicitization Challenge for Binary Factor Analysis.*
Maria Angelica Cueto, UC Berkeley, **Enrique A. Tobis**, Universidad de Buenos Aires, and **Josephine Yu***, Georgia Tech (1067-05-846)

1:30PM (1993)   *Complex and non-Archimedean Coamoebas.*
Mounir Nisse* and **Frank Sottile**, Texas A&M University, College Station (1067-14-1116)

2:00PM (1994) ►   *Computing Node Polynomials for Plane Curves.*
Florian Block, University of Michigan (1067-05-566)

2:30PM (1995)   *Lifting Tropical Curves and Linear Systems on Graphs.*
Eric Edward Katz, University of Texas (1067-14-685)

3:00PM (1996)   *The tropical motivic nearby fiber.*
Alan Stapledon, University of British Columbia (1067-14-1003)

3:30PM (1997)   *Newton-Okounkov bodies of Bott-Samelson varieties.*
David E Anderson, University of Washington (1067-14-1501)

4:00PM (1998)   *Newton-Okounkov bodies and crystal bases.*
Kiumars Kaveh, Univ. of Pittsburgh (1067-14-1248)

4:30PM (1999)   *Milnor numbers of projective hypersurfaces and the chromatic polynomial of graphs.*
June Huh, UIUC (1067-14-696)

5:00PM (2000)   *Spaces of rational curves in flag manifolds and the quantum Chevalley formula.* Preliminary report.
Leonardo C. Mihalcea*, Baylor University/Univ. of Louisiana at Lafayette, and **Anders S. Buch**, Rutgers University (1067-14-831)

5:30PM (2001)   *Finiteness of cominuscule quantum K-theory.* Preliminary report.
Anders S Buch*, Rutgers University, **Pierre-Emmanuel Chaput**, Laboratoire de Mathematiques, Jean Leray, **Leonardo C Mihalcea**, Baylor University, and **Nicolas Perrin**, Universite Pierre et Marie Curie (1067-14-2339)

AMS Special Session on Structure Theory for Matroids and Graphs, II

1:00 PM – 5:50 PM   Napoleon C2, 3rd Floor, Sheraton

Organizers: **Bogdan Oporowski**, Louisiana State University

           James G. Oxley, Louisiana State University

1:00PM *Fragile matroids.* Preliminary report.
► (2002) **Dillon Mayhew***, **Carolyn Chun**, **Geoff Whittle**, Victoria University of Wellington, and **Stefan van Zwam**, Centrum Wiskunde & Informatica (1067-05-1432)

1:30PM *Towards a splitter theorem for internally*
(2003) *4-connected binary matroids.* Preliminary report.
Carolyn Chun*, **Dillon Mayhew**, Victoria University of Wellington, and **James Oxley**, Louisiana State University (1067-05-1190)

2:00PM *Characterizations of fundamental*
(2004) *transversal matroids.*
Joseph E. Bonin*, The George Washington University, **Joseph P.S. Kung**, University of North Texas, and **Anna de Mier**, Universitat Politecnica de Catalunya (1067-05-356)

2:30PM *Parcels defined by congruence conditions*
(2005) *and evaluations of the Tutte polynomial.* Preliminary report.
Joseph Kung, University of North Texas (1067-05-314)

3:00PM *Quaternionic unimodular matroids.*
(2006) **David G. Wagner**, University of Waterloo (1067-05-643)

3:30PM Discussion

4:00PM *When the branch width is high...*
(2007) **Jim Geelen**, University of Waterloo, Ontario, Canada, and **Stefan H.M. van Zwam***, Centrum Wiskunde en Informatica, Amsterdam, The Netherlands (1067-05-345)

4:30PM *Non-degenerate even cycle matroids.*
(2008) **Bertrand Guenin**, **Irene Pivotto***, University of Waterloo, and **Paul Wollan**, University of Rome, La Sapienza (1067-05-1092)

5:00PM *Growth rates in minor-closed classes of*
(2009) *matroids.*
Peter Nelson* and **Jim Geelen**, University of Waterloo (1067-05-926)

5:30PM *Unavoidable Minors of 3-Connected*
► (2010) *Matroids.* Preliminary report.
Deborah A Chun, Louisiana State University (1067-05-718)

AMS Special Session on The Mathematics of Modeling Multiscale Heterogeneous Media

1:00 PM – 5:50 PM   **Maurepas, 3rd Floor, JW Marriott**

Organizers: **Robert P. Lipton**, Louisiana State University
Tadele A. Mengesha, Louisiana State University

1:00PM *Why does nature go multiscale?*
(2011) **Yury Grabovsky***, Temple University, and **Lev Truskinovsky**, Ecole Polytechnique (1067-74-847)

2:00PM *Models for growth of heterogeneous*
(2012) *sandpiles via Mosco convergence.*
Marian Bocea, North Dakota State University (1067-35-1560)

2:30PM *L-infinity estimates for gradients of*
(2013) *solutions to some nonlinear problems.* Preliminary report.
Yuliya Gorb, University of Houston (1067-35-1989)

3:00PM *New optimal bounds for two-phase*
(2014) *non-well-ordered composites.*
Liping Liu, University of Houston (1067-35-419)

3:30PM *Gradient estimates for elliptic equation*
(2015) *and system from composite media.*
Ellen Shiting Bao*, University of Minnesota, **Haigang Li**, Beijing Normal University, **Yanyan Li**, Rutgers University, and **Biao Yin**, University of Connecticut (1067-35-2125)

4:00PM *Coordinate transformations of two scale*
(2016) *convergent sequences.*
Bacim Alali* and **Daniel Onofrei**, University of Utah (1067-00-2420)

4:30PM *Local representations of L^∞ norms for*
(2017) *weakly convergent sequences of gradient fields.*
Tadele Mengesha* and **Robert Lipton**, Louisiana State University (1067-35-797)

5:00PM *Modeling damage evolution in high*
(2018) *strength titanium alloys.*
Michael Stuebner*, North Carolina State University, and **Robert P Lipton**, Louisiana State University (1067-74-1909)

5:30PM *Upscaling methods of flow and transport*
(2019) *in heterogeneous porous media.*
Yan Li*, Institute for Mathematics and Its Applications, and **Chen Yuguang**, Chevron Energy Technology Company (1067-65-939)

AMS Special Session on Global Dynamics of Discrete Dynamical Systems in the Plane with Applications

1:00 PM – 5:50 PM   **Maurepas Room, 3rd Floor, Sheraton**

Organizers: **M. R. S. Kulenovic**, University of Rhode Island
Orlando Merino, University of Rhode Island

1:00PM *Period doubling cascades for ordinary*
(2020) *differential equations.* Preliminary report.
James A. Yorke, Univ of Maryland (1067-37-2072)

1:30PM *Stability and bifurcation of a discrete*
► (2021) *logistic competition model.* Preliminary report.
Saber N Elaydi, Trinity University (1067-39-680)

2:00PM (2022) *A Juvenile-Adult Discrete-Time Model Of Exploited Fishery Systems.* Preliminary report.
Nianpeng Li and **Abdul-Aziz Yakubu***, Howard University (1067-92-1659)

2:30PM (2023) *On invariant curves of certain nonhyperbolic equilibria of planar competitive systems.*
Orlando Merino, RI (1067-39-1731)

3:00PM (2024) *Reducing the order of a second-order difference equation with application to a biological model.*
H Sedaghat, Virginia Commonwealth University (1067-39-1780)

3:30PM Discussion.

4:00PM (2025) *Properties of a semiflow related to the integers.*
Alica Miller, University of Louisville (1067-37-1755)

▶ 4:30PM (2026) *Basins of Attraction of Equilibrium Points of Monotone Difference Equations.*
Ann Brett, University of Rhode Island (1067-39-1238)

5:00PM (2027) *The Topology of Tank Stirring.*
Barry Alan Peratt*, Winona State University, and **Judy A. Kennedy**, Lamar University (1067-37-1596)

5:30PM (2028) *The dynamics of Pielou's equation under the effect of harvesting.* Preliminary report.
Ziyad AlSharawi*, Sultan Qaboos University, **R. Abu-Saris**, Walden University, and **M. Rhouma**, Sultan Qaboos University (1067-39-445)

AMS Special Session on Measures of Entanglement of Macromolecules and Their Applications

1:00 PM – 5:50 PM   Napoleon C1, 3rd Floor, Sheraton

Organizers: **Isabel K. Darcy**, University of Iowa
Kenneth C. Millett, University of California, Santa Barbara
Eric J. Rawdon, University of St. Thomas
Mariel Vazquez, San Francisco State University

1:00PM (2029) *The writhe additivity formula and its applications to biomolecules.*
Christian Laing*, Departments of Mathematics and Chemistry, New York University, and **De Witt Sumners**, Florida State University (1067-54-264)

1:30PM (2030) *The variance of the writhe of equilateral random polygons.* Preliminary report.
Yuanan Diao, UNC Charlotte (1067-57-1234)

▶ 2:00PM (2031) *Entanglement Statistics for lattice models of polymer systems.*
C Soteros, University of Saskatchewan (1067-82-1736)

2:30PM (2032) *Oriented Skein Relation for HFK and Biological Applications.*
Candice Renee Price, University of Iowa (1067-55-1890)

3:00PM (2033) *The Classification of Rational Tangle Adjacencies, with Applications to Complex Nucleoprotein Assemblies.*
Dorothy Buck*, Imperial College London, and **Ken Baker**, University of Miami (1067-57-871)

3:30PM (2034) *DNA Knotting in Bacteriophage Capsids.*
De Witt Sumners, Florida State University (1067-92-925)

4:00PM (2035) *The XerCD-FtsK system unlinks replication catenanes in a stepwise manner.*
Mariel Vazquez, San Francisco State University (1067-92-930)

▶ 4:30PM (2036) *A lower bound for the trisecants of a knot.* Preliminary report.
Teresita Ramirez-Rosas, Grand Valley State University (1067-54-633)

5:00PM (2037) *Computational results on tight composite knots.*
Jason Cantarella*, University of Georgia, **Eric Rawdon**, St. Thomas University, and **Albert La pointe**, University of Georgia (1067-53-1222)

▶ 5:30PM (2038) *Flat Ribbon Links in* $\mathbb{R}^2$. Preliminary report.
Elizabeth Denne*, Smith College, **John M Sullivan**, Technische Universität, Berlin, and **Nancy C Wrinkle**, Northeastern Illinois University (1067-57-1256)

AMS Special Session on Time Scales: Theory and Applications, II

1:00 PM – 5:20 PM   Napoleon B1, 3rd Floor, Sheraton

Organizers: **Billy Jackson**, St. Xavier University
Joan Hoffacker, Clemson University

1:00PM (2039) *Variational theory on time scales including the delta indefinite integral.*
Natalia da Costa Martins* and **Delfim F. M. Torres**, University of Aveiro, Portugal (1067-49-447)

▶ 1:30PM (2040) *Alternative Solutions of Inhomogeneous Second-Order Linear Dynamic Equations on Time Scales.*
Douglas R. Anderson, Concordia College-Moorhead (1067-34-24)

2:00PM (2041) *Foundations of Nabla Fractional Calculus on Time Scales and Inequalities.* Preliminary report.
George A. Anastassiou, University of Memphis (1067-39-122)

2:30PM ► (2042) *A time scales model of competition in the southern pine beetle, Dendroctonus frontalis.* Preliminary report.
Heidi Berger*, Simpson College, **Jo Hoffacker**, Clemson University, and **Raegan Siwatu**, Texas Tech University (1067-39-814)

3:00PM (2043) *Dynamic inequalities of Bernoulli type.*
Namjip Koo* and **Sung Kyu Choi**, Chungnam National University, Korea (1067-34-1065)

3:30PM (2044) *A Fourth Order Boundary Value Problem with Multiple Resonance Conditions on a Time Scale.* Preliminary report.
Eric R Kaufmann, University of Arkansas at Little Rock (1067-34-778)

4:00PM (2045) *Shift operators and stability in delayed dynamic equations.*
Youssef Naim Raffoul*, Unversity of Dayton, and **Murat Adivar**, Izmir University of Economics (1067-37-1106)

4:30PM ► (2046) *Recursive Representations for the Unique Solution of the Transport Equation on Isolated Time Scales.*
Chris R Ahrendt, University of Wisconsin-Eau Claire (1067-39-754)

5:00PM (2047) *Existence of positive solutions of a first order dynamic equations on time scales.*
Seshadev Padhi, Birla Institute of Technology, Mesra, Ranchi (1067-34-2389)

MAA Invited Paper Session on The Intersection of Graphs and Geometry, II

1:00 PM – 3:15 PM **Rhythms II and III, 2nd Floor, Sheraton**

Organizer: **Edward Scheinerman**, Johns Hopkins University

1:00PM (2048) *Kleitman's Parity Theorem for crossing numbers.*
R. Bruce Richter, University of Waterloo (1067-AF-1481)

1:30PM (2049) *Interval Shadow Orders.*
William T. Trotter, Georgia Institute of Technology (1067-AF-1536)

2:00PM (2050) *Precedence Orders.*
Jerry Spinrad* and **Garrett Linn**, Vanderbilt University (1067-AF-1541)

2:30PM (2051) *Chromatic Number of the Plane: Yesterday, Today & Tomorrow.*
Alexander Soifer, University of Colorado (1067-AF-1545)

MAA Minicourse #13: Part B

1:00 PM – 3:00 PM **Ile de France III, 3rd Floor, JW Marriott**

Creating demonstrations and guided explorations for multivariable calculus using CalcPlot3D.
Organizer: **Paul Seelburger**, Monroe Community College

MAA Minicourse #1: Part B

1:00 PM – 3:00 PM **Ile de France II, 3rd Floor, JW Marriott**

Special relativity through a linear algebraic lens.
Organizer: **John de Pillis**, Unversity of California Riverside

MAA Minicourse: #5: Part B

1:00 PM – 3:00 PM **Ile de France I, 3rd Floor, JW Marriott**

A Game Theory path to quantitative literacy.
Organizers: **David L. Housman**, Goshen College
Richard A. Gillman, Valparaiso University

AMS Session on Commutative Rings and Fields

1:00 PM – 5:25 PM **Napoleon D1, 3rd Floor, Sheraton**

1:00PM (2052) *Annihilators of Local Cohomology.* Preliminary report.
Laura R Lynch, University of Nebraska-Lincoln (1067-13-625)

1:15PM (2053) *Minimal Zero-Dimensional Extensions.*
Marcela Chiorescu*, Georgia College & State University, GA, and **Fred Richman**, Florida Atlantic University, FL (1067-13-56)

1:30PM (2054) *Castelnuovo-Mumford regularity and relation type.*
Linh Cao Huy*, Hue University, Vietnam, and **Brodmann Markus**, University of Zurich, Switzerland (1067-13-800)

1:45PM (2055) *Characterizations of various integral domains of the form $A + B[\Gamma^*]$.* Preliminary report.
Gyu Whan Chang, University of Incheon, **Byung Gyun Kang** and **Jung Wook Lim***, Pohang University of Science and Technology (1067-13-879)

2:00PM (2056) *Integer-valued Polynomials over Noncommutative Rings.*
Nicholas J. Werner, The Ohio State University (1067-13-880)

2:15PM (2057) *On modules whose proper homomorphic images are of smaller cardinality.*
Adam Salminen*, University of Evansville, and **Greg Oman**, Ohio University (1067-13-907)

2:30PM (2058) *Some properties of term ideals.*
Hamid Kulosman, University of Louisville (1067-13-1758)

2:45PM (2059) *Tendencies of Trivariate Monomial Resolutions.* Preliminary report.
Jared L Painter, The University of Texas at Arlington (1067-13-2229)

3:00PM *Asymptotic Regularity of Powers of Ideal*
(2060) *Sheaves.*
Wenbo Niu, University of Illinois at
Chicago (1067-13-1812)

3:15PM *Irreducible Divisor Graphs.*
(2061) **Nicholas R Baeth**, University of Central
Missouri (1067-13-1223)

3:30PM *Cut Sets of Zero-Divisor Graphs of*
(2062) *Commutative Rings.*
Michael Axtell, University of St. Thomas,
Nicholas Baeth, University of Central
Missouri, **Shane Redmond**, Eastern
Kentucky University, and **Joe Stickles,
Jr.***, Millikin University (1067-13-1888)

3:45PM *Unique Maximal-Length Factorization in*
► (2063) *Numerical Semigroups.* Preliminary
report.
Lance Bryant*, **James Hamblin** and
Lenny Jones, Shippensburg University
(1067-13-2118)

4:00PM *An Infinite System of Hypercomplex*
► (2064) *Numbers.*
Paul A Sundheim, University of
Wisconsin (1067-13-222)

4:15PM *Factorization Techniques for Numerical*
► (2065) *Semigroup Rings.*
Paul Baginski*, Universite Lyon 1, and **K.
Grace Kennedy**, University of California,
Santa Barbara (1067-12-1494)

4:30PM *DEMOCRACY: a new technique for solving*
(2066) *polynomial systems of equations over
finite fields via stochastic local search.*
Preliminary report.
Gregory V. Bard, Fordham University
(1067-12-1908)

4:45PM *Random Trinomials and Lower Binomials.*
► (2067) Preliminary report.
Kenneth B Ascher, SUNY Stony Brook
(Texas A&M REU) (1067-12-196)

5:00PM *Twin Irreducible Polynomials over* $\mathbf{F}_2$ -
► (2068) *Background.* Preliminary report.
Cooper Boniece* and **Gove Effinger**,
Skidmore College (1067-12-1319)

5:15PM *Twin Irreducible Polynomials over* $\mathbf{F}_2$ -
► (2069) *Conjectures.* Preliminary report.
Cooper Boniece and **Gove Effinger***,
Skidmore College (1067-12-1324)

AMS Session on Systems Theory, Information, and Computer Science

1:00 PM – 4:10 PM   **Cornet Room,
8th Floor, Sheraton**

1:00PM *Formal Definition of Probability and*
► (2070) *Probabilistic Function on Finite and
Discrete Sample Space for Proving
Security of Cryptographic Systems Using
Mizar.*
Hiroyuki Okazaki*, **Yasunari Shidama**
and **Yuichi Futa**, Shinshu University
(1067-94-740)

1:15PM *Construction of zero autocorrelation*
► (2071) *stochastic waveforms.* Preliminary report.
Somantika Datta, University of Idaho
(1067-94-1311)

1:30PM *Quantization dimension for an infinite*
(2072) *iterated function system.*
Mrinal Kanti Roychowdhury, The
University of Texas-Pan American
(1067-94-1354)

1:45PM *Resilient Modulus Modeling by Neural*
(2073) *Network Models with Information Theory
Approach.* Preliminary report.
Ali Saleh Shaqlaih*, University of North
Texas at Dallas, **Luther White**, University
of Oklahoma, and **Musharraf Zaman**,
Dept of Civil Engineering, University of
Oklahoma (1067-94-1917)

2:00PM *Identification of Regime-Switching*
(2074) *Systems with Structural Uncertainties.*
Shaobai Kan*, CUNY, and **George Yin**,
Wayne State University (1067-93-804)

2:15PM *Exact Controllability of a Rayleigh beam*
(2075) *with a single boundary control.*
Ahmet Ozkan Ozer, Iowa State
University (1067-93-1686)

2:30PM *Autoregulation Mechanisms in Complex*
(2076) *Networks.*
Radu C Cascaval, University of Colorado
at Colorado Springs (1067-93-1956)

2:45PM *Discrete-Time Sensitivity Analysis for*
► (2077) *MinMax Parameter Choice for the Heat
Equation.*
John Teye Brown, Louisiana Tech
University (1067-93-2301)

3:00PM *Changing Base without Losing Space.*
► (2078) **Yevgeniy Dodis**, New York University,
Mihai Patrascu and **Mikkel Thorup***,
AT&T Labs-Research (1067-68-1246)

3:15PM *Random 2-SAT Solution Components and*
► (2079) *a Fitness Landscape.*
Damien Pitman, SUNY Cortland
(1067-68-1936)

3:30PM *Maximum-Weight Connected-Subgraph*
► (2080) *Problems.*
Peh H. Ng*, University of Minnesota,
Morris, and **Herve L. Kerivin**, Clemson
University (1067-90-1378)

3:45PM *Weighted Graph Model for Document*
► (2081) *Classification.*
Qin Wu*, **Eddie Fuller** and **Cun-Quan
Zhang**, West Virginia University
(1067-68-609)

4:00PM *Tracing contaminants using non-linear*
► (2082) *filter approximation.*
Menaka B Navaratna*, Florida Gulf Coast
University, and **Channa N Navaratna**,
Indiana University of PA (1067-68-1390)

AMS Session on Group Theory, II and Topological and Lie Groups

1:00 PM – 3:55 PM   **Mardi Gras F,**
                                    3rd Floor, Marriott

1:00PM *Galois groups of p-class towers.*
(2083) **Michael R Bush**, Smith College
        (1067-20-1820)

1:15PM *Genericity of Filling Elements.*
(2084) **Brent B. Solie**, University of Illinois at
        Urbana-Champaign (1067-20-1051)

1:30PM *Faithful actions of automorphisms on the*
(2085) *space of orderings of a group.*
        Thomas Koberda, Harvard University
        (1067-20-2285)

1:45PM $\mathbb{Z}_p$*-modules with partial decomposition*
(2086) *bases.* Preliminary report.
        Peter Loth, Sacred Heart University
        (1067-20-350)

2:00PM *Distance in the Ellipticity Graph.*
(2087) **Yakov I Berchenko-Kogan**, California
        Institute of Technology (1067-20-425)

2:15PM *Groups of Graphs of Groups.*
▶ (2088) **Thomas Q. Sibley**, St. John's
        University/College of St. Benedict
        (1067-20-477)

2:30PM *Groups of finite Morley rank with a split*
(2089) BN*-pair of rank* 1.
        Josh Wiscons, University of Colorado at
        Boulder (1067-20-841)

2:45PM *On weighted ℓ^2-Betti numbers of Coxeter*
(2090) *groups.* Preliminary report.
        Dan Boros, Ohio State University
        (1067-20-2222)

3:00PM *On Automorphisms of the Hyperelliptic*
(2091) *Torelli Group.*
        Leah R. Childers, Pittsburg State
        University (1067-20-1912)

3:15PM *The Boltzmann Principle and Degeneracy.*
(2092) **Dennis F. Cudia**, Rockford, Illinois
        (1067-20-1263)

3:30PM *Changing the rate at which a sequence in*
(2093) $\mathbb{R}^n$ *is forced to converge to zero.*
        T. Christine Stevens, Saint Louis
        University (1067-22-2391)

3:45PM *Elements of Polynomials evaluated at*
(2094) *points of* βS. Preliminary report.
        Kendall Williams, Howard University
        (1067-22-1287)

AMS Session on Operator Theory

1:00 PM – 4:25 PM   **Balcony L, 4th Floor, Marriott**

1:00PM *A direct calculation of the vector*
(2095) *Riemann constants corresponding to the*
        marked doubles.
        Cyrus P. Aryana, Saginaw Valley State
        University (1067-47-1170)

1:15PM *The Mackey Machine for Groupoid*
(2096) *Crossed Products.*
        Geoff R Goehle, Western Carolina
        University (1067-47-412)

1:30PM *Partially normal composition operators*
(2097) *relevant to weighted directed trees.*
        George R. Exner, Bucknell University, **Il
        Bong Jung**, **Eun Young Lee*** and **Mi
        Ryeong Lee**, Kyungpook National
        University (1067-47-721)

1:45PM *Backwards weighted shifts and*
(2098) n*-contractivity.* Preliminary report.
        George R Exner, Bucknell University
        (1067-47-650)

2:00PM *The Inverse of a Two-level Positive*
(2099) *Definite Toeplitz Operator.*
        Selcuk Koyuncu* and **Hugo
        Woerdeman**, Drexel University
        (1067-47-316)

2:15PM *Schatten p-class Weighted Composition*
(2100) *Operators on Bergman Spaces of the Unit*
        Ball.
        Waleed Khaled Al-Rawashdeh, Montana
        Tech of the University of Montana
        (1067-47-1852)

2:30PM *The Szegö Kernel for Certain*
(2101) *Non-Pseudoconvex domains in* $\mathbb{C}^2$.
        M Anthony Gilliam*, University of
        Montana, Missoula, and **Jennifer
        Halfpap**, University of Montana
        (1067-47-176)

2:45PM *On characterization of range spaces of*
(2102) *composition operator on spaces of entire*
        functions.
        S. Mukherjee*, **F. Jafari**, University of
        Wyoming, and **J. E. McInroy**, Dept.
        Electrical & Computer Engineering,
        University of Wyoming (1067-47-324)

3:00PM *The Muckenhoupt-type estimations for*
(2103) *the best constants in multidimensional*
        modular inequalities over spherical
        cones. Preliminary report.
        Chang-Pao Chen*, Hsuan Chuang
        University, **Jin-Wen Lan**, National Tsing
        Hua University, and **Dah-Chin Luor**,
        I-Shou University (1067-47-351)

3:15PM *Irregular orbits of operators.*
(2104) **Gabriel T Prajitura**, SUNY Brockport
        (1067-47-427)

3:30PM *Multiplication Operators between*
(2105) *Lipschitz-Type Spaces of an Infinite Tree.*
        Robert F. Allen*, University of Wisconsin
        - La Crosse, **Flavia Colonna**, George
        Mason University, and **Glenn R. Easley**,
        System Planning Corporation
        (1067-47-441)

3:45PM *Estimating Arbitrary Symmetric Norms.*
(2106) Preliminary report.
        Duane K Farnsworth, Marshall
        University (1067-47-689)

4:00PM *Multipliers and hereditary subalgebras of*
(2107) *operator algebras.* Preliminary report.
        Damon M. Hay, Sam Houston Sate
        University / University of North Florida
        (1067-47-1952)

4:15PM *On the Uniqueness of Topological*
(2108) *Degrees for Densely Defined Mappings Involving Variants of* (S_+) *Operators.* Preliminary report. **Dhruba R Adhikari**, Mississippi University for Women (1067-47-2149)

MAA Session on Alternative Approaches to Traditional Introductory Statistics Courses, II

1:00 PM – 5:55 PM   Great Ballroom E, 5th Floor, Sheraton

Organizers: **Brian T. Gill**, Seattle Pacific University

Nancy J. Boynton, SUNY Fredonia

Michael A. Posner, Villanova University

1:00PM *Two-way tables: A path less traveled.*
▶ (2109) **Melinda Miller Holt*** and **Stephen M. Scariano**, Sam Houston State University (1067-B1-961)

1:20PM *Teaching Two Tailed Tests.* Preliminary
▶ (2110) report. **Philip S. Marcus**, Bradley University (1067-B1-197)

1:40PM *Consequences of Resequencing Topics in*
(2111) *an Introductory Statistics Course.* **Chris J Malone***, **Tisha L Hooks** and **April T Kerby**, Winona State University (1067-B1-2220)

2:00PM *A different flavor of introductory*
(2112) *statistics: Teaching students to really cook.* **Robert delMas***, **Joan Garfield**, **Andrew Zieffler**, **Laura Le**, **Rebekah Isaak**, **Jiyoon Park** and **Laura Ziegler**, University of Minnesota, Twin Cities (1067-B1-1565)

2:20PM *An Active Approach to Statistical*
▶ (2113) *Inference using Randomization Methods.* Preliminary report. **Todd M Swanson*** and **Jill L VanderStoep**, Hope College (1067-B1-1940)

2:40PM *Early Inference: Using Bootstraps to*
▶ (2114) *Introduce Confidence Intervals.* **Robin H Lock*** and **Patti Frazer Lock**, St. Lawrence University (1067-B1-2075)

3:00PM *Early Inference: Using Randomization to*
(2115) *Introduce Hypothesis Tests.* **Kari F. Lock***, Harvard University, **Eric F. Lock**, University of North Carolina at Chapel Hill, and **Dennis F. Lock**, Iowa State University (1067-B1-2270)

3:20PM *Success!Teaching Introductory Statistics*
▶ (2116) *Online.* **Pamela B. Omer**, Western New England College (1067-B1-922)

3:40PM *Introductory Statistics and Science: A*
▶ (2117) *Collaborative Teaching Approach.* **M. Leigh Lunsford*** and **Alix D. Dowling Fink**, Longwood University (1067-B1-1906)

4:00PM *Deep Assignments: Getting Students to*
▶ (2118) *Think.* Preliminary report. **K. Scott Alberts**, Truman State University (1067-B1-1747)

4:20PM *Looking for a semester long project to*
▶ (2119) *enhance student learning? We have one for you!* **Pamela Omer*** and **Marilyn Pelosi**, Western New England College (1067-B1-2053)

4:40PM *FREE CLICKERS!: Using PollEverywhere for*
▶ (2120) *Formative Assessment in the Classroom.* Preliminary report. **Michael A Posner**, Villanova University (1067-B1-1047)

5:00PM *Some Active Learning Ideas in*
(2121) *Introductory Statistics Courses.* **John C. Wagaman**, Western Carolina University (1067-B1-527)

5:20PM *Revising a course to meet the GAISE*
(2122) *guidelines.* **Kimberly A Roth**, Juniata College (1067-B1-730)

5:40PM *Seeing Statistics.* Preliminary report.
▶ (2123) **John P Travis**, Mississippi College (1067-B1-1639)

MAA Session on Using Program Assessment to Improve Student Learning

1:00 PM – 2:55 PM   La Galerie 2, 2nd Floor, Marriott

Organizers: **Bonnie Gold**, Monmouth University

William A. Marion, Valparaiso University

Jay A. Malmstrom, Oklahoma City Community College

1:00PM *Assessment: What are we learning?*
▶ (2124) Preliminary report. **Sarah V Cook*** and **Donna LaLonde**, Washburn University (1067-Y1-1567)

1:20PM *Course-based Program Assessment.*
▶ (2125) **Joe A. Guthrie** and **Helmut Knaust***, University of Texas at El Paso (1067-Y1-1670)

1:40PM *Assessing and Improving Students'*
▶ (2126) *Fundamental Mathematical Skills throughout their STEM Education.* Preliminary report. **Lee A Evans***, **Jeremy M Riehl** and **Kristin M Arney**, United States Military Academy (1067-Y1-2174)

2:00PM *Constructing Tests for Program*
(2127) *Assessment.* Preliminary report. **Jacalyn M Huband**, University of West Florida (1067-Y1-1653)

2:20PM *Improving Student Proficiency in*
▶ (2128) *Statistics through Core Curriculum Assessment at Virginia Military Institute.* Preliminary report. **Vonda K Walsh**, Virginia Military Institute (1067-Y1-1913)

2:40PM   *Using Rubrics for Calculus 2 Maple Labs.*
▶ (2129)   **Jenn D. Berg**, Fitchburg State Univeristy
(1067-Y1-1911)

MAA Session on Trends in Undergraduate Mathematical Biology Education, II

1:00 PM – 5:35 PM   Rhythms I, 2nd Floor, Sheraton

Organizers: **Timothy D. Comar**, Benedictine University

Raina Robeva, Sweet Briar College

Mike Martin, Johnson County Community College

1:00PM   *The constructive role of noise in cellular*
▶ (2130)   *processes.* Preliminary report.
Patricia Theodosopoulos* and **Ted Theodosopoulos**, Saint Ann's School
(1067-X1-2181)

1:20PM   *Student Projects for the Mathematical*
▶ (2131)   *Modeling of Wound Healing.* Preliminary report.
Richard Schugart, Western Kentucky University (1067-X1-1660)

1:40PM   *Introduction to Mathematical Models in*
(2132)   *Biology.* Preliminary report.
Mazen Shahin, Delaware State University (1067-X1-2146)

2:00PM   *Mathematical Biology Modules Based on*
(2133)   *Modern Molecular Biology and Modern Discrete Mathematics.*
Terrell L. Hodge*, Western Michigan University, and **Raina Robeva**, Sweet Briar College (1067-X1-2095)

2:20PM   *Integrating mathematics and the life*
▶ (2134)   *sciences to better prepare graduates for medical school.*
Kelly E Matthews*, **Peter Adams** and **Merrilyn Goos**, University of Queensland (1067-X1-1424)

2:40PM   *Addressing the Revision of the MCAT*
▶ (2135)   *Within the Symbiosis Project.*
Jeff R Knisley, East Tennessee State University (1067-X1-1588)

3:00PM   *BioMath Program at Florida Tech: How to*
▶ (2136)   *Sustain it?* Preliminary report.
Semen Koksal*, **D. Carroll** and **R. Sinden**, Florida Institute of Technology (1067-X1-1894)

3:20PM   *Short Courses in Biomathematics*
▶ (2137)   *Topics for NSF Undergraduate Biology Mathematics Program (UBM Grant).*
Preliminary report.
Ron Barnes* and **Edwin Tecarro**, University of Houston-Downtown (1067-X1-2148)

3:40PM   *UBM Group Seminar Discussions:*
(2138)   *Grappling with Issues beyond the Curriculum.*
D. Brian Walton, James Madison University (1067-X1-1645)

4:00PM   *Integrated undergraduate research*
▶ (2139)   *experiences in biological and mathematical sciences for minority students.* Preliminary report.
Kaibin Fu, Prairie View A&M University (1067-X1-1361)

4:20PM   *Mathematics, Biology, and Imaging:*
▶ (2140)   *Engaging Undergraduates in Research on the Fringe of Mathematical Biology.*
Aaron Luttman, Clarkson University (1067-X1-812)

4:40PM   *Interdisciplinary Training in*
(2141)   *Mathematical Biology Through Team-based Undergraduate Research and Courses.*
Jason E Miller, Truman State University (1067-X1-1746)

5:00PM   *Teaching Mathematical Modeling:*
(2142)   *Challenging Torricelli's Law.*
Brynja R. Kohler*, **Janice Bodily**, **Jessica Munns Davis**, **James Haefner** and **James Powell**, Utah State University (1067-X1-2221)

5:20PM   *Transformative Research and Training in*
▶ (2143)   *biological and bio-inspired systems in undergraduate mathematics.* Preliminary report.
Padmanabhan Seshaiyer* and **Maria Emelianko**, George Mason University (1067-X1-1461)

MAA Session on Humanistic Mathematics, II

1:00 PM – 6:00 PM   Mardi Gras BC, 3rd Floor, Marriott

Organizers: **Gizem Karaali**, Pomona College

Mark Huber, Claremont McKenna College

Dagan Karp, Harvey Mudd College

1:00PM   *Grading Without Numbers.*
▶ (2144)   **Russell W Howell**, Westmont College (1067-I1-2419)

1:20PM   *Three Humanistic Approaches.*
▶ (2145)   Preliminary report.
Satish C. Bhatnagar, University of Nevada Las Vegas (1067-I1-2397)

1:40PM   *What do we mean by mathematical*
▶ (2146)   *proof?*
Todd CadwalladerOlsker, California State University, Fullerton (1067-I1-90)

2:00PM   *Student Inquiry into the Limits of*
(2147)   *Knowledge - Removing Barriers in Mathematics for Liberal Arts.* Preliminary report.
Philip K Hotchkiss*, Westfield State University, **Julian F Fleron**, **Volker Ecke** and **Christine von Renessee**, Westfield State College (1067-I1-2215)

2:20PM   *Teaching Reading and Writing*
▶ (2148)   *Mathematics for Social Justice.*
Teodora B. Cox, SUNY Fredonia (1067-I1-1988)

2:40PM ► (2149) *Transmitting Philosophies of Mathematics Through Pedagogy.* **Erin R. Moss**, Millersville University of Pennsylvania (1067-I1-1848)

3:00PM ► (2150) *Development of the appreciation of mathematics via teaching mathematics education for the public interest.* Preliminary report. **José María Menéndez*** and **Laura Jacobsen**, Radford University (1067-I1-977)

3:20PM ► (2151) *Mathematical Learning: A Humanistic Re-formation of Core-curricular Instruction.* Preliminary report. **Clyde I. Greeno**, The MALEI Mathematics Institute (1067-I1-2093)

3:40PM ► (2152) *Success in the university mathematics classroom: Learning from the voices of students.* **Angie Hodge*** and **Christina D Weber**, North Dakota State University (1067-I1-1699)

4:00PM ► (2153) *Psychologism as an Issue in the Mathematical Philosophy of Bertrand Russell.* **Carl Behrens**, Alexandria, VA (1067-I1-1506)

4:20PM ► (2154) *A Humanistic Approach to Teaching Mathematics to the Liberal Arts Student.* **James P Fulton**, SUNY Suffolk County Community College (1067-I1-1896)

4:40PM (2155) *A 2-week summer camp.* **Kazem Mahdavi**, The University of Texas at Tyler (1067-I1-431)

5:00PM ► (2156) *Cooperative Systems Course: The Mathematics of Harmony.* **Chris Arney**, United States Military Academy (1067-I1-242)

5:20PM Wrap up and group discussion.

MAA Session on Influences of the Calculus Reform Movement on the Teaching of Mathematics, II

1:00 PM – 4:35 PM   Grand Couteau Room, 5th Floor, Sheraton

Organizers: **Steven R. Benson**, Lesley University
Marilyn Carlson, Arizona State University
Ellen E. Kirkman, Wake Forest University
Joe Yanik, Emporia State University

1:00PM ► (2157) *Finding the Sum of an Infinite Series.* **Robert P Webber**, Longwood University (1067-J1-544)

1:20PM ► (2158) *A Survey Transition Course.* **William Johnston***, Randolph-Macon College, and **Alex M McAllister**, Centre College (1067-J1-557)

1:40PM (2159) *Not Just Grading the Answer: Assessing Process and Communication Effectively and Efficiently with Rubrics.* **Michael A Brilleslyper***, **Trae D Holcomb** and **Dustin D Keck**, U. S. Air Force Academy (1067-J1-1333)

2:00PM (2160) *An Emphasis on Application and Communication through Podcasts.* **Erick B Hofacker**, University of Wisconsin - River Falls (1067-J1-2060)

2:20PM ► (2161) *The Impact of Web-Based Homework on University Calculus Students.* **Teodora B. Cox***, SUNY Fredonia, and **Stacey Singer**, Salamanca High School (1067-J1-1995)

2:40PM ► (2162) *Getting in on the Ground Floor: How Growing Up with Calculus Reform Helps with Web 2.0.* **Steven W. Morics**, University of Redlands (1067-J1-2289)

3:00PM ► (2163) *Preparation for a technical core: Algebra & trigonometry at the Air Force Academy.* Preliminary report. **Beth Schaubroeck*** and **Michael Courtney**, U.S. Air Force Academy (1067-J1-2083)

3:20PM (2164) *Using Mathematical Modeling in Undergraduate Mathematics Courses to Promote Creativity and Critical Thinking.* **Kristin Arney***, **Hilary Fletcher** and **Gerald Kobylski**, United States Military Academy (1067-J1-2092)

3:40PM ► (2165) *Making Calculus Come Alive with Dynamic Visualization.* Preliminary report. **Paul E Seeburger**, Monroe Community College (1067-J1-2379)

4:00PM (2166) *Differential Equations as a basis for Calculus II.* **Duff Campbell**, Hendrix College (1067-J1-1053)

4:20PM ► (2167) *Bayesian Analysis of a Real Galton Board.* Preliminary report. **Marcus Pendergrass**, Hampden-Sydney College (1067-J1-1993)

MAA Session on the Mathematical Foundations for the Quantitative Disciplines

1:00 PM – 3:35 PM   Grand Chenier Room, 5th Floor, Sheraton

Organizers: **Yajun Yang**, Farmingdale State College of SUNY
Laurette Foster, Prairie View A&M University
Ray E. Collings, Georgia Perimeter College
K. L. D. Gunawardena, University of Wisconsin-Oshkosh

1:00PM *Not your mother's college algebra course*
(2168) *– rethinking how we prepare students for quantitative reasoning across the disciplines.* Preliminary report.
Suzanne I Doree, Augsburg College, Minneapolis (1067-N1-1619)

1:20PM *Integrating Statistics into College*
► (2169) *Algebra: Providing the Mathematics that Students Need.*
Sheldon P. Gordon, Farmingdale State College (1067-N1-1899)

1:40PM *Ways to teach meaningful modeling in*
► (2170) *algebra-based courses.* Preliminary report.
Marko Kranjc, Western Illinois University (1067-N1-1093)

2:00PM *A year's experience with implementing a*
► (2171) *data modeling based course at the College Algebra level.*
D Scott Dillery, Lindsey Wilson College (1067-N1-1391)

2:20PM *The Right Stuff: Are We Teaching It In*
► (2172) *College Algebra?*
Lisa S Yocco, Georgia Southern University (1067-N1-586)

2:40PM *Using Global Warming to Teach College*
(2173) *Algebra: Preliminary Report.*
Jill F McGowan, Howard University (1067-N1-2044)

3:00PM *Discrete Dynamical Modeling for*
(2174) *Freshmen.*
Richard D. West, Francis Marion University (1067-N1-1625)

3:20PM *Faculty and Student Support for*
(2175) *Quantitative Reasoning and How to Make it Count.*
David G Taylor, Roanoke College (1067-N1-393)

MAA *General Contributed Paper Session, XIII*

1:00 PM – 4:40 PM   **St. Claude, 3rd Floor, JW Marriott**

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

1:00PM *A New View of Presentation Theory for*
(2176) *C*-algebras.*
William Benjamin Grilliette, University of Nebraska - Lincoln (1067-Z1-1601)

1:15PM *Crossed Products of Certain Non-Simple*
(2177) *Non-Commutative C*-Algebras.*
Julian M Buck, Francis Marion University (1067-Z1-2077)

1:30PM *Positive operators on Banach lattices and*
(2178) *domination properties.*
Pedro Tradacete, University of Barcelona (1067-Z1-1702)

1:45PM Break

2:00PM *Positive Solutions for Infinite*
(2179) *Semipositone Problems with Falling Zeros.*
Jinglong Ye*, Center for Computational Sciences, Mississippi State University, **EunKyoung Lee**, Pusan National University, and **Ratnasingham Shivaji**, Mississippi State University (1067-Z1-443)

2:15PM *Demystifying the Dirac Delta "Function".*
► (2180) Preliminary report.
Trent C Kull, Winthrop University (1067-Z1-1484)

2:30PM *What is a Functional Equation?*
► (2181) Preliminary report.
Maria Neophytou, Purdue University (1067-Z1-2208)

2:45PM *Measuring discontinuities of functions.*
► (2182) **Djalalidin Djayanbaev**, Rogers State University (1067-Z1-603)

3:00PM *Archimedean Hypersurfaces.*
► (2183) **Vincent Coll**, Lehigh University, **Jeff Dodd**, Jacksonville State University, and **Michael Harrison***, King's College London (1067-Z1-1728)

3:15PM *K-energy on hypersurfaces.*
(2184) **TseChing Lien**, University of Wisconsin, Madison (1067-Z1-2245)

3:30PM *Fractals and their Dimensions.*
► (2185) Preliminary report.
A Melissa Glass, Wake Forest University (1067-Z1-2254)

3:45PM *Parabolic Monoids of Matrices.*
(2186) **Eric D. Bancroft**, North Carolina State University (1067-Z1-1070)

4:00PM *"Rigidity" and Language of Fundamental*
► (2187) *Groups of Manifolds.* Preliminary report.
Luc Patry, University of Arkansas at Pine Bluff (1067-Z1-1844)

4:15PM *Cleavability over Fréchet-Urysohn LOTS.*
(2188) **Shari S Levine**, University of Oxford, Mathematical Institute (1067-Z1-61)

4:30PM *Semigroup Operators in Cauchy*
► (2189) *Problems.*
Yang Xinyao, University of Missouri-Columbia (1067-Z1-1562)

MAA *General Contributed Paper Session, XIV*

1:00 PM – 5:10 PM   **St. Jerome, 3rd Floor, JW Marriott**

Organizers: **Kristen Meyer**, Wisconsin Lutheran College

Thomas R. Hagedorn, The College of New Jersey

1:00PM *Vector coloring of graphs.*
► (2190) **Louis Deaett**, University of Victoria (1067-Z1-2207)

1:15PM *Uniquely D-colorable Digraphs With*
(2191) *Large Girth.* Preliminary report.
Liam Rafferty, University of Montana (1067-Z1-2265)

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1:30PM *Graph Factors Including or Excluding*
► (2192) *Certain Edge Sets in Bipartite Graphs.*
Hollie L Buchanan, West Liberty
University (1067-Z1-2108)

1:45PM *Mean First Passage Times and the*
(2193) *Kemeny Constant on Tree Networks.*
Mary E Allison, University of Wyoming
(1067-Z1-2032)

2:00PM *Investigations in Linear Algebra and*
► (2194) *Combinatorics related to Biclique*
Decompositions of Graphs.
Shadiyah Amani Mangru, George Mason
University (1067-Z1-1623)

2:15PM *Conditions for Embedding a Partial Latin*
► (2195) *Square Inside a Latin Square of a Given*
Order. Preliminary report.
Serge C Ballif, The Pennsylvania State
University (1067-Z1-1999)

2:30PM *Probabilistic Pentominos and other*
► (2196) *Polyforms.*
Dale K Hathaway* and **Mark J**
Lockwood, Olivet Nazarene University
(1067-Z1-530)

2:45PM *A Combinatorial Formula for Certain*
► (2197) *Two-Dimensional Sequences Related to*
Generalized Bernoulli Polynomials.
Preliminary report.
Hieu D Nguyen, Rowan University
(1067-Z1-738)

3:00PM Break

3:15PM *Tetranomial Thue Equations of Small*
(2198) *Degree.* Preliminary report.
Daniel P. Wisniewski*, DeSales
University, and **Helen G. Grundman**,
Bryn Mawr College (1067-Z1-1290)

3:30PM *The Shard Intersection Order on the*
(2199) *Symmetric Group.*
Erin Elizabeth Bancroft, North Carolina
State University (1067-Z1-900)

3:45PM *Generalizations of Thompson's Group V.*
(2200) Preliminary report.
Matthew F Short, Binghamton University
(1067-Z1-2024)

4:00PM *On the solution of the conjugacy problem*
► (2201) *of Thompson's group F.*
Candace M. Schenk, Binghamton
University (1067-Z1-2001)

4:15PM *A new proof of the Pieri rule for the dual*
(2202) *Grothendieck polynomials.*
Derek H Heilman* and **Jennifer Morse**,
Drexel University (1067-Z1-2296)

4:30PM *The Schur Property on Positive Tensor*
(2203) *Products.* Preliminary report.
Wei-Kai Lai, University of South Carolina,
Salkehatchie (1067-Z1-2368)

4:45PM *The behavior of Conway's RATS*
► (2204) *sequences.*
Johann A. Thiel, University of Illinois
Urbana-Champaign (1067-Z1-1986)

5:00PM *New Ramanujan congruences for*
(2205) *partition related eta-quotients.*
T Hudson Harper, University of South
Carolina (1067-Z1-1882)

MAA General Contributed Paper Session, XV

1:00 PM – 4:40 PM   **Orleans, 3rd Floor, JW Marriott**

Organizers: **Kristen Meyer**, Wisconsin
Lutheran College

Thomas R. Hagedorn, The
College of New Jersey

1:00PM *Cool Calculus; From Weight Loss to*
(2206) *Climate Change in an Intermediate*
Calculus Course.
Mihaela Dobrescu, Christopher Newport
University (1067-Z1-2331)

1:15PM *Grand finale: The Basel Problem as a*
► (2207) *culminating objective in Calculus II.*
Preliminary report.
Jonathan A Cox, SUNY Fredonia
(1067-Z1-2052)

1:30PM *Dogs don't need calculus.*
► (2208) **Michael D. Bolt***, Calvin College,
and **Daniel C. Isaksen**, Wayne State
University (1067-Z1-2364)

1:45PM *RGB to HSI.* Preliminary report.
► (2209) **Yesem Kurt Peker***, Randolph College,
Catherine Beneteau, University of South
Florida, and **David A. Eubanks**, Johnson
C. Smith University (1067-Z1-2163)

2:00PM *Squigonometry: Using Calculus to*
► (2210) *Develop New Transcendental Functions.*
Preliminary report.
William E Wood, Hendrix College
(1067-Z1-884)

2:15PM *Using a Wireless Tablet to Lecture in*
► (2211) *Mathematics Classes.* Preliminary report.
Peter L Staab, Fitchburg State University
(1067-Z1-1250)

2:30PM *Writing Projects For Mathematics*
(2212) *Courses.*
Dawn Archey, Marymount Manhattan
College (1067-Z1-2167)

2:45PM *CalcTool 3: An applet to visualize 3D*
► (2213) *objects.* Preliminary report.
James S Rolf, United States Air Force
Academy (1067-Z1-2256)

3:00PM *Utilizing Web-Based Mathematical*
► (2214) *Resources in Teaching Nontraditional*
Undergraduate Students in Online
Learning Environments.
Michael D Miner, American Public
University System (1067-Z1-1869)

3:15PM *Integrating Technology to Match*
► (2215) *Learning Styles in an Online Mathematics*
Course. Preliminary report.
Denise J LeGrand, University of
Arkansas at Little Rock (1067-Z1-561)

3:30PM *Using Online Mathematics Modules for*
► (2216) *Physical Chemistry Students.* Preliminary
report.
Jim Gleason*, **Daniel Burton** and **Martin**
Bakker, The University of Alabama
(1067-Z1-45)

3:45PM *From Zero to LATEX in Three Weeks:*
▶ (2217) *Teaching Scientific Typesetting to*
Undergraduates.
Ryan S. Higginbottom, Washington &
Jefferson College (1067-Z1-2197)

4:00PM *Teaching Introductory Computer*
(2218) *Programming to Mathematics Majors*
with SAGE.
Don K Krug, Northern Kentucky
University (1067-Z1-1926)

4:15PM *The School of Empathy.*
(2219) **Rosanna Iembo***, University of Calabria,
Italy, and **Irene Iaccarino**, School of
Music in Crotone (1067-Z1-630)

4:30PM *An Inhibitor to Learning College Level*
▶ (2220) *Mathematics Math Anxiety: Problems and*
Proposed Solutions.
Agnes M Rash, Saint Joseph's University
(1067-Z1-1254)

SIAM Minisymposium on Graph Theory

1:00 PM – 5:55 PM   **Bayside A, 4th Floor, Sheraton**

Organizers: **Michael Ferrara**, University
of Colorado, Denver

Stephen Hartke, University
of Nebraska-Lincoln

1:00PM *Spectra of Hypergraphs.*
(2221) **Joshua N Cooper*** and **Aaron M**
Dutle, University of South Carolina
(1067-15-1312)

1:30PM *On pre-coloring extension to*
(2222) *list-colorings.*
Maria Axenovich*, Iowa State University,
Joan Hutchinson, Macalester College,
and **Michelle Lastrina**, Iowa State
University (1067-05-1821)

2:00PM *A Variation of the Classical Turán Type*
(2223) *Problem.*
Zi-Xia Song, University of Central Florida
(1067-05-1205)

2:30PM *Ramsey-type Numbers for Degree*
(2224) *Sequences.*
Arthur Busch*, University of Dayton,
Michael Ferrara, **Michael Jacobson**,
University of Colorado Denver, and
Stephen Hartke, University of
Nebraska-Lincoln (1067-05-2004)

3:00PM *Saturation Numbers for Families of*
(2225) *Subdivisions.*
Michael Ferrara, **Michael Jacobson**,
University of Colorado Denver, **Kevin**
Milans, University of South Carolina,
Craig Tennenhouse, University of New
England, and **Paul S Wenger***, University
of Colorado Denver (1067-05-2068)

3:30PM *2-factors with long cycles in cubic*
▶ (2226) *graphs.*
André Kündgen*, California State
University San Marcos, and **R. Bruce**
Richter, University of Waterloo, CANADA
(1067-05-1429)

4:00PM *Distributing vertices on a hamiltonian*
(2227) *cycle.*
Colton Magnant, Atlanta, GA
(1067-05-315)

4:30PM *New Ore-Type Conditions for H-Linked*
(2228) *Graphs.*
Michael Ferrara*, University of Colorado
Denver, **Ronald Gould**, Emory University,
Michael Jacobson, University of
Colorado Denver, **Pfender Florian**,
Universität Rostock, Rostock, Germany,
Jeffrey Powell, Samford University, and
Thor Whalen, Methodic Solutions, Inc.,
Atlanta GA (1067-05-1273)

5:00PM *Immersion in digraphs and related*
(2229) *problems.* Preliminary report.
Alexandra Ovetsky Fradkin* and **Paul**
D. Seymour, Princeton University
(1067-05-1008)

5:30PM *On Maximum Cuts of Connected*
▶ (2230) *Digraphs.* Preliminary report.
Guantao Chen*, Georgia State University,
Manzhan Gu, Shanghai Universiyt of
Finance and Economics, and **Nana Li**,
Georgia State University (1067-05-2413)

AWM Workshop Panel Discussion

1:00 PM – 2:15 PM   **Mardi Gras E,**
3rd Floor, Marriott

Starting a career in mathematics.

Moderator: **Susan Williams**, University
of South Alabama

Panelists: **Sarah Frick**, Furman
University

Pierre Gremaud, SAMSI and
North Carolina State
University

T.Christine Stevens, Saint
Louis University

Tad White, National Security
Agency

AMS Session on Probability, II

1:15 PM – 5:25 PM   **Bayside B, 4th Floor, Sheraton**

1:15PM *On a Processor Sharing Queue That*
(2231) *Models Balking.*
Qiang Zhen*, University of North Florida,
J.S.H. van Leeuwaarden, Eindhoven
University of Technology, and **Charles**
Knessl, University of Illinois at Chicago
(1067-60-803)

1:30PM *Large Deviations and Importance*
(2232) *Sampling for a Feedforward Network.*
Leila Setayeshgar* and **Hui Wang**,
Brown University (1067-60-295)

1:45PM *A Stochastic Stefan Problem.*
▶ (2233) **Kunwoo Kim***, **Richard B. Sowers** and
Zhi Zheng, University of Illinois at
Urbana-Champaign (1067-60-410)

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2:00PM *Stochastic control for linear systems with*
(2234) *fractional Brownian motion.* Preliminary
report.
Yalcin Sarol, University of Southern
Indiana (1067-60-1161)

2:15PM *Counting and Partition Function*
(2235) *Asymptotics for Subordinate Killed*
Brownian Motion.
Sarah N Bryant, Dickinson College
(1067-60-2283)

2:30PM *Continuous-time random walks, their*
(2236) *scaling limits, and connections with*
stochastic integration. Preliminary report.
Meredith Burr, Rhode Island College
(1067-60-849)

2:45PM *Ruin probability in the Cramér-Lundberg*
(2237) *model with risky investments.* Preliminary
report.
Sheng Xiong* and **Wei-Shih Yang**,
Temple University (1067-60-585)

3:00PM *A Nash Equilibrium with several large*
▶ (2238) *traders.* Preliminary report.
Tankut Dogrul, University of Tennessee
at Chattanooga (1067-60-582)

3:15PM *Quantile Hedging for Guaranteed*
(2239) *Minimum Death Benefits with*
Regime-Switching. Preliminary report.
Yumin Lolita Wang*, Binghamton
University (SUNY), and **Gang George Yin**,
Wayne State University (1067-60-1126)

3:30PM *Cluster K and*
(2240) *probabilistic-Nearest-Neighbor*
Predictions in Foreign Exchange Markets.
Vindya Kumari Pathirana*, University of
South Florida, Tampa, Florida, and
Kandethody M. Ramachandran,
University of South Florida, Tampa, FL
(1067-60-2015)

3:45PM Discussion

4:00PM *Average time until fixation of mutant*
▶ (2241) *allele in a given population.* Preliminary
report.
Komi Segno Messan*, North Carolina
A&T State University, **Michael Lynch** and
Matthew Ackerman, Indiana University
(1067-60-2319)

4:15PM *A Point Process Model for Simulating*
(2242) *Gang Violence.*
Mark Allenby*, Pepperdine University,
Kym Louie, Harvey Mudd College, and
Marina Masaki, University of California
Irvine (1067-60-2193)

4:30PM *Budding yeast, branching processes, and*
▶ (2243) *generalized Fibonacci numbers.*
Peter Olofsson* and **Ryan C Daileda**,
Trinity University (1067-60-468)

4:45PM *Estimating bacterial lag phase: a*
▶ (2244) *branching process approach.*
Peter Olofsson and **Xin Ma***, Trinity
University (1067-60-469)

5:00PM *On equality of critical exponents in*
(2245) *inhomogeneous percolation models.*
Preliminary report.
John C. Wierman and **Matthew R.A.
Sedlock***, Johns Hopkins University
(1067-60-1489)

5:15PM *On equality of critical exponents in*
(2246) *homogeneous percolation models.*
Preliminary report.
John C. Wierman* and **Matthew R. A.
Sedlock**, Johns Hopkins University
(1067-60-1491)

AMS Session on Dynamical Systems, and Topics in Analysis, II

1:15 PM – 4:55 PM   Southdown Room,
                                 4th Floor, Sheraton

1:15PM *Mapping Schemes Realizable by*
(2247) *Obstructed Topological Polynomials.*
Gregory A Kelsey, University of Illinois
at Urbana-Champaign (1067-37-31)

1:30PM *Quadratic-like mappings and iterated*
▶ (2248) *Weierstrass elliptic functions.*
Joshua J Clemons, Virginia Tech
(1067-37-164)

1:45PM *Orbit distributions in iterated function*
(2249) *systems with finitely many forms.*
R E Lampe, South University
(1067-37-1584)

2:00PM *Families of periodic orbits of fractal*
▶ (2250) *billiard tables.*
Michel L. Lapidus and **Robert G.
Niemeyer***, University of California,
Riverside (1067-37-1874)

2:15PM *Dynamics of degree 3 rational maps with*
▶ (2251) *parabolic fixed points.* Preliminary report.
Rika Hagihara*, St. Mary's College
of Maryland, and **Jane Hawkins**,
University of North Carolina at Chapel
Hill (1067-37-2116)

2:30PM *Strong Orbit Equivalence and Residuality.*
(2252) **Brett M. Werner**, University of Northern
Iowa (1067-37-2282)

2:45PM *Product structure of the spectral zeta*
(2253) *function of the Sturm-Liouville operator*
on fractals. Preliminary report.
Nishu Lal* and **Michel Lapidus**,
University of California, Riverside
(1067-37-2287)

3:00PM *Random Subshifts of Finite Type.*
(2254) **Kevin McGoff**, University of Maryland
(1067-37-1934)

3:15PM *Partition zeta functions of self-similar*
(2255) *measures.*
Kate E. Ellis, California State University,
Stanislaus, **Michel L. Lapidus**, University
of California, Riverside, **Michael C.
Mackenzie**, University of Connecticut,
and **John A. Rock***, California State
University, Stanislaus (1067-28-55)

3:30PM *q-Orthogonal Polynomial Solutions to*
▶ (2256) *a Class of Differential-Difference Equations.* Preliminary report.
Daniel Joseph Galiffa, Penn State Erie (1067-33-631)

3:45PM *Parametric solution of certain nonlinear*
(2257) *differential equations with applications in cosmology.*
Jennie D'Ambroise*, University of Minnesota at Morris, and **Floyd L WIlliams**, University of Massachusetts at Amherst (1067-33-1566)

4:00PM *High-Dimensional Counterexamples of*
(2258) *the Kaplan-Yorke Conjecture: Fractal Dimension of the Drosophila Circadian Clock.*
Fathallah-Shaykh M Hassan, The University of Alabama at Birmingham (1067-37-1241)

4:15PM *Orthogonal and Maximal Sets for*
▶ (2259) *Bernoulli Measures.* Preliminary report.
Bryan Archer, **Rees Dooley**, **Reid Kelley**, **Alyssa Leone** and **Patrick Orchard***, University of Oklahoma (1067-28-140)

4:30PM *The truncated matrix-valued K-moment*
(2260) *problem on $\mathbb{R}^d$, $\mathbb{C}^d$, and $\mathbb{T}^d$.* Preliminary report.
David P. Kimsey* and **Hugo J. Woerdeman**, Drexel University (1067-28-1291)

4:45PM *A simple, general proof of Descartes' rule*
▶ (2261) *of signs.*
Robert J. Blodgett, Food and Drug Administration (1067-26-399)

AMS Session on Partial Differential Equations, IV

1:15 PM – 4:10 PM   Balcony N, 4th Floor, Marriott

1:15PM *Ideal Magnetohydrodynamics,*
(2262) *Non-Newtonian fluids with infinite Weissenberg number and related issues.*
X.J. Wang* and **Michael Renardy**, Virginia Tech (1067-35-999)

1:30PM *Global existence and long time behavior*
(2263) *of the general Ericksen-Leslie system.*
Xiang Xu*, The Pennsylvania State University, **Hao Wu**, Fudan University, and **Chun Liu**, The Pennsylvania State University (1067-35-1355)

1:45PM *Open Loop Stabilization of Nonlinear*
(2264) *Schrodinger Equation.*
Turker Ozsari, Dogus University (1067-35-896)

2:00PM *Bifurcation problem of the discrete*
(2265) *nonlinear Schrödinger equations with sign changing nonlinearity.* Preliminary report.
Guoping Zhang, Morgan State University (1067-35-1072)

2:15PM *Instability of Nonmonotone Magnetic*
▶ (2266) *Equilibria of the Relativistic Vlasov-Maxwell System.*
Jonathan Ben-Artzi, Brown University (1067-35-415)

2:30PM *Exact solutions for a class of 3D-ratholes*
▶ (2267) *in highly frictional granular solids.*
Daniel Arrigo, **Long H Le*** and **Jason Torrence**, University of Central Arkansas (1067-35-416)

2:45PM *Bifurcation and Continuation Analysis of*
▶ (2268) *Equilibria of the Diblock Copolymer Equation in One Dimension.* Preliminary report.
Ian Johnson, George Mason University (1067-35-2405)

3:00PM *An existence and uniqueness theorem*
(2269) *for periodic solutions to Boussinesq equations.* Preliminary report.
Timur Milgrom* and **David M. Ambrose**, Drexel University (1067-35-1609)

3:15PM *Existence of a unique solution to a*
(2270) *quasilinear elliptic equation with data at an interior point of the domain.* Preliminary report.
Diane Denny, Texas A&M University-Corpus Christi (1067-35-1703)

3:30PM *A multiplicity result for a class of infinite*
(2271) *positone problems.*
Eunkyung Ko*, Mississippi State University, **Eunkyoung Lee**, Pusan National University, and **R. Shivaji**, Mississippi State University (1067-35-171)

3:45PM *Positive Solutions for Infinite*
(2272) *Semipositone Problems on Exterior Domains.*
Eunkyoung Lee, Pusan National University, Busan, **Lakshmi Sankar*** and **Ratnasingham Shivaji**, Mississippi State University (1067-35-162)

4:00PM *S-Shaped Bifurcation Curves in*
(2273) *Ecosystems.*
Sarath Sasi*, Mississippi State University, **Eunkyoung Lee**, Pusan National University, Busan, and **Ratnasingham Shivaji**, Mississippi State University (1067-35-160)

AMS Session on Topics in Analysis

1:15 PM – 5:25 PM   La Galerie 1,
2nd Floor, Marriott

1:15PM *Results on asymptotically regular matrix*
(2274) *methods.* Preliminary report.
Jeff Connor*, Ohio University, and **Hafize Gok**, Afyonkarahisar Kocatepe Univ. (1067-40-1448)

1:30PM *Scattered Data Interpolation on*
(2275) *Embedded Submanifolds with Restricted Positive Definite Kernels: Sobolev Error Estimates.*
Edward J. Fuselier*, High Point University, and **Grady B. Wright**, Boise State University (1067-41-283)

1:45PM *On a free boundary problem for an*
(2276) *American put option under the CEV process.*
Charles Knessl and **Miao Xu***, University of Illinois at Chicago (1067-41-949)

2:00PM *Approximation of the Generalized*
(2277) *Poisson-Binomial Distribution.*
Salam Md. Mahbubush Khan, Alabama
A&M University (1067-41-1427)

2:15PM *Greedy Algorithms in Compressed*
(2278) *Sensing.*
Vladimir Temlyakov and **Mingrui
Yang***, University of South Carolina
(1067-41-1569)

2:30PM *Exact asymptotics of the error of*
(2279) *adaptive approximation by harmonic
splines.*
Yuliya Babenko*, Kennesaw State
University, and **Tatyana Leskevich**,
Dnepropetrovsk National University
(1067-41-1937)

2:45PM *Two weight problem for the Fourier*
(2280) *transform.* Preliminary report.
Ryan M Berndt, Otterbein University
(1067-42-341)

3:00PM *Fibonacci Sets are good for discrepancy*
(2281) *and numerical integration.*
Rui Yu*, **Vladimir Temlyakov** and
Dmitriy Bilyk, University of South
Carolina (1067-42-1598)

3:15PM L^p *estimates for a singular integral*
(2282) *operator motivated by Calderón's second
commutator.*
Eyvindur Ari Palsson, Cornell University
(1067-42-2276)

3:30PM *Dichotomy Conjecture on Compact*
(2283) *Symmetric Spaces.*
Sanjiv Kumar Gupta, Sultan Qaboos
University (1067-42-2307)

3:45PM *Buffon's needle landing near Besicovitch*
(2284) *irregular self-similar sets.*
Matthew R Bond* and **A Volberg**,
Michigan State University (1067-42-2324)

4:00PM *Multiplier theorem on anisotropic Hardy*
(2285) *spaces.*
Li-An Daniel Wang, University of Oregon
(1067-42-2426)

4:15PM *Completely Simple Topological*
▶ (2286) *Semihypergroups.*
Norbert N Youmbi, Saint Francis
University (1067-43-1134)

4:30PM *Sharp L^p-bounds for a perturbation of*
(2287) *Burkholder's Martingale Transform.*
Nicholas Boros, Michigan State
University (1067-43-2240)

4:45PM *Inversion of the circular Radon transform*
▶ (2288) *from partial data.*
Rim Gouia, University of Texas at
Arlington (1067-00-72)

5:00PM *Consistency Conditions for Cone-Beam CT*
(2289) *Data Acquired with a Linear Source
Trajectory.*
Margo S. Levine*, Department of
Radiology, Harvard Medical School and
Massachusetts General Hospital, **Emil Y.
Sidky** and **Xiaochuan Pan**, Department
of Radiology, The University of Chicago
(1067-45-274)

5:15PM *Dynamical Systems Method for Solving*
▶ (2290) *Ill-conditioned Linear Algebraic Systems.*
Preliminary report.
Sapto Indratno* and **Alexander
G Ramm**, Kansas State University
(1067-45-2369)

ASL Invited Address

2:00 PM – 2:50 PM   Bayside C, 4th Floor, Sheraton

(2291) *Special ultrafilters, generic ultrafilters,
and partitions.*
Andreas Blass, University of Michigan
(1067-03-63)

AWM Workshop: Research Presentations by Recent Ph.D.s, II

**2:30 PM – 3:50 PM   Mardi Gras E,
3rd Floor, Marriott**

Chair: **Alissa Crans**, Loyola
Marymount University

2:30PM *Predicting Tumor Response to*
▶ (2292) *Vascular-Targeting Therapies using a
Mathematical Model.*
Jana Gevertz, The College of New Jersey
(1067-92-188)

3:00PM *Steklov-Neumann Eigenproblems and*
(2293) *Nonlinear Elliptic Equations with
Nonlinear Boundary Conditions.*
Nsoki Mavinga*, University of Rochester,
NY, and **M. N. Nkashama**, University of
Alabama at Birmingham (1067-35-261)

3:30PM *Compatibility of Slender Body Theory and*
(2294) *Surface Traction.*
Eva M Strawbridge, University of
Chicago (1067-92-201)

AMS-MAA-SIAM Gerald and Judith Porter Public Lecture

**3:00 PM – 4:30 PM   Great Ballroom
A-C, 5th Floor, Sheraton**

(2295) *From flapping birds to space telescopes:
The mathematics of origami.*
Robert J. Lang, Robert J. Lang Origami
(1067-00-37)

4:00PM Light refreshments will be served after
the lecture.

ASL Session for Contributed Papers, II

3:10 PM – 4:20 PM   Bayside C, 4th Floor, Sheraton

3:10PM *A pretabular classical relevance logic.*
(2296) **John G. Mersch**, Xavier University of
Louisiana

3:35PM *More reverse mathematics of the*
(2297) *Heine-Borel theorem.*
Jeffry Hirst*, Appalachian State
University, and **Jessica Miller**, Catawba
Valley Community College

4:00PM
(2298)
Reverse mathematics and equivalents of the axiom of choice.
Damir D. Dzhafarov, University of Chicago, and **Carl Mummert***, Marshall University

MAA Minicourse #10: Part B

3:30 PM – 5:30 PM
Ile de France I,
3rd Floor, JW Marriott

Teaching introductory statistics.
Organizers: **Michael A. Posner**,
Villanova University
Carolyn K. Cuff,
Westminster College

AMS-MAA Special Film Presentation

4:30 PM – 5:30 PM
Great Ballroom
A-C, 5th Floor, Sheraton

Between the Folds: Watch ten artists and theoretical scientists fuse mathematics and sculpture in the medium of origami.

AMS Banquet Reception

6:30 PM – 7:30 PM
Mardi Gras Foyer,
3rd Floor, Marriott

AMS Banquet

7:30 PM – 10:00 PM
Mardi Gras D,
3rd Floor, Marriott

Steven H. Weintraub
AMS Associate Secretary
Bethlehem, Pennsylvania

Gerard A. Venema
MAA Associate Secretary
Grand Rapids, Michigan