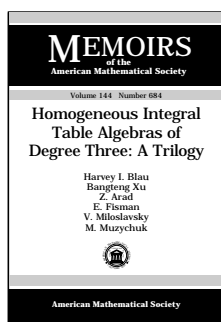


New Publications Offered by the AMS

Algebra and Algebraic Geometry



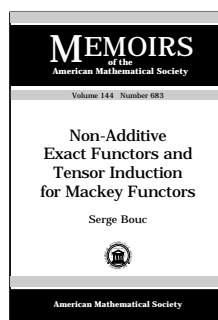
Homogeneous Integral Table Algebras of Degree Three: A Trilogy

Harvey I. Blau and Bangteng Xu, *Northern Illinois University, DeKalb*, and Z. Arad, E. Fisman, V. Miloslavsky, and M. Muzychuk, *Bar-Ilan University, Ramat-Gan, Israel*

Contents: *Part I. Homogeneous Integral Table Algebras of Degree Three with a Faithful Real Element, H. I. Blau and B. Xu:* Introduction; Known facts and some consequences; Homogeneous ITA's of arbitrary degree; Some results on bases with a standard quotient; Extensions of $T_n(3)$, $n > 1$; Extensions of V_3 ; Extensions of V_2 and V_4 ; Extensions of $T_0(3)$; Proof of the main theorem; References; *Part II. On Antisymmetric Homogeneous Integral Table Algebras of Degree Three, Z. Arad, E. Fisman, V. Miloslavsky, and M. Muzychuk:* Introduction; General facts; The universal covering; Perfect triples; References; *Part III. Homogeneous Integral Table Algebras of Degree Three With No Nontrivial Linear Elements, H. I. Blau:* Introduction; Tame and wild elements; The array; The cover; Proofs of Theorem A and Corollary C; Association schemes; References.

Memoirs of the American Mathematical Society, Volume 144, Number 684

March 2000, 89 pages, Softcover, ISBN 0-8218-2021-4, LC 99-058341, 2000 *Mathematics Subject Classification:* 13A99, 20C05, 20C99, 05E30, 16P10, **Individual member \$25**, List \$42, Institutional member \$34, Order code MEMO/144/684N



Non-Additive Exact Functors and Tensor Induction for Mackey Functors

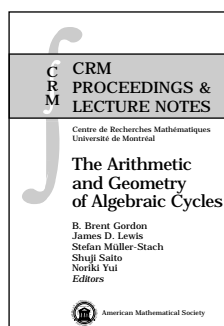
Serge Bouc, *Université Paris, France*

Contents: Introduction; Non additive exact functors; Permutation Mackey functors; Tensor induction for Mackey functors; Relations with the functors

\mathcal{L}_U ; Direct product of Mackey functors; Tensor induction for Green functors; Cohomological tensor induction; Tensor induction for p -permutation modules; Tensor induction for modules; Bibliography.

Memoirs of the American Mathematical Society, Volume 144, Number 683

March 2000, 74 pages, Softcover, ISBN 0-8218-1951-8, LC 99-057594, 2000 *Mathematics Subject Classification:* 18A22, 19A22; 20J05, **Individual member \$25**, List \$41, Institutional member \$33, Order code MEMO/144/683N



The Arithmetic and Geometry of Algebraic Cycles

B. Brent Gordon, *University of Oklahoma, Norman*, James D. Lewis, *University of Alberta, Edmonton, Canada*, Stefan Müller-Stach, *Universität Essen, Germany*, Shuji Saito, *Tokyo Institute of Technology, Oh-okayama, Meguro-ku, Japan*, and Noriki Yui, *Queen's University, Kingston, ON, Canada*, Editors

The NATO ASI/CRM Summer School at Banff offered a unique, full, and in-depth account of the topic, ranging from introductory courses by leading experts to discussions of the latest developments by all participants. The papers have been organized into three categories: cohomological methods; Chow groups and motives; and arithmetic methods.

As a subfield of algebraic geometry, the theory of algebraic cycles has gone through various interactions with algebraic K -theory, Hodge theory, arithmetic algebraic geometry, number theory, and topology. These interactions have led to developments such as a description of Chow groups in terms of algebraic K -theory, the application of the Merkurjev-Suslin theorem to the arithmetic Abel-Jacobi mapping, progress on the celebrated conjectures of Hodge, and of Tate, which compute cycles class groups respectively in terms of Hodge theory or as the invariants of a Galois group action on étale cohomology, the conjectures of Bloch and Beilinson, which explain the zero or pole of the L -function of a variety and interpret the leading non-zero coefficient of its Taylor expansion at a critical point, in terms of arithmetic and geometric invariant of the variety and its cycle class groups.

The immense recent progress in the theory of algebraic cycles is based on its many interactions with several other areas of mathematics. This conference was the first to focus on both arithmetic and geometric aspects of algebraic cycles. It brought together leading experts to speak from their various points of view. A unique opportunity was created to explore and view the depth and the breadth of the subject. This volume presents the intriguing results.

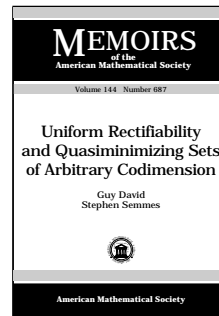
This item will also be of interest to those working in number theory.

Contents: *Cohomological methods:* S. Abdulali, Filtrations on the cohomology of abelian varieties; D. Arapura, Building mixed Hodge structures; R.-O. Buchweitz and H. Flenner, The Atiyah-Chern character yields the semiregularity map as well as the infinitesimal Abel-Jacobi map; J. Dupont, R. Hain, and S. Zucker, Regulators and characteristic classes of flat bundles; B. Harris and B. Wang, Height pairings asymptotics and Bott-Chern forms; K. Kato and S. Usui, Logarithmic Hodge structures and classifying spaces; *Chow groups and motives:* M. Asakura, Motives and algebraic de Rham cohomology; J. I. Burgos Gil, Hermitian vector bundles and characteristic classes; M. Hanamura, The mixed motive of a projective variety; C. Pedrini, Bloch's conjecture and the K -theory of projective surfaces; N. Ramachandran, From Jacobians to one-motives: Exposition of a conjecture of Deligne; S. Saito, Motives, algebraic cycles and Hodge theory; *Arithmetic methods:* C. F. Doran, Picard-Fuchs uniformization: Modularity of the mirror map and mirror-moonshine; E. Z. Goren, Hilbert modular varieties in positive characteristic; Y. Goto, On the Néron-Severi groups of some $K3$ surfaces; J. van Hamel, Torsion zero-cycles and the Abel-Jacobi map over the real numbers; K. Kimura, A remark on the Griffiths groups of certain product varieties; J. Nekovář, p -adic Abel-Jacobi maps and p -adic heights; A. Shiho, Crystalline fundamental groups and p -adic Hodge theory; H. Verrill and N. Yui, Thompson series, and the mirror maps of pencils of $K3$ surfaces.

CRM Proceedings & Lecture Notes, Volume 24

February 2000, 432 pages, Softcover, ISBN 0-8218-1954-2, LC 99-057916, 2000 *Mathematics Subject Classification:* 11Gxx, 14C30, 14C35, 14C25, 14C17, 14F05, 14F10, 14F42, 14F43, 14F20, 14G35, 19Dxx, 19Fxx, **Individual member \$66**, List \$110, Institutional member \$88, Order code CRMP/24N

Analysis



Uniform Rectifiability and Quasiminimizing Sets of Arbitrary Codimension

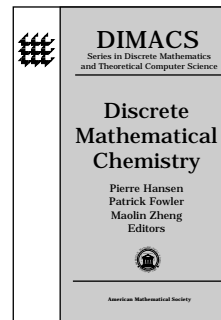
Guy David, *Université de Paris-Sud, Orsay, France*, and Stephen Semmes, *Rice University, Houston, TX*

Contents: Introduction; Quasiminimizers; Uniform rectifiability and the main result; Lipschitz projections into skeleta; Local Ahlfors-regularity; Lipschitz mappings with big images; From Lipschitz functions to projections; Regular sets and cubical patchworks; A stopping-time argument; Proof of main Lemma 8.7; Big projections; Restricted and dyadic quasiminimizers; Applications; Bibliography.

Memoirs of the American Mathematical Society, Volume 144, Number 687

March 2000, 132 pages, Softcover, ISBN 0-8218-2048-6, LC 99-058340, 2000 *Mathematics Subject Classification:* 49Q20; 28A75, 42B99, **Individual member \$26**, List \$44, Institutional member \$35, Order code MEMO/144/687N

Applications



Discrete Mathematical Chemistry

Pierre Hansen, *GERARD, Montreal, PQ, Canada*, Patrick Fowler, *University of Exeter, England*, and Maolin Zheng, *Lexis-Nexis, Mianmisburg, OH*, Editors

This volume contains the proceedings from the first DIMACS meeting on discrete mathematical chemistry held at Rutgers University (New Brunswick, NJ). The contributions reflect the presentations and spotlight the breadth of current research on the topic—from the Benzenoid Clar problem to the Wulff-shape of sphere packings. Much of the volume reflects the combined mathematical and physical interest in the new molecules, fullerenes.

This DIMACS conference highlighted the range of opportunities for fruitful and informed collaboration across the mathematics-chemistry boundaries. The interdisciplinary nature of the contributions pays testament to the fact that “real” chemistry and “real” mathematics do indeed interact.

This item will also be of interest to those working in discrete mathematics and combinatorics.

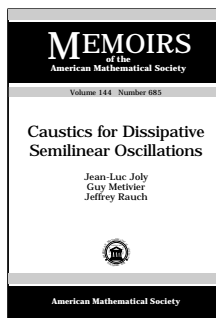
Continued

Contents: H. Abeledo and G. Atkinson, The Clar and Fries problems for benzenoid hydrocarbons are linear programs; S. C. Basak and B. D. Gute, Use of graph invariants in QMSA and predictive toxicology; G. Brinkmann, Isomorphism rejection in structure generation programs; L. Bytautas, D. J. Klein, M. Randić, and T. Pisanski, Foldedness in linear polymers: A difference between graphical and Euclidean distances; G. Caporossi, P. Hansen, and M. Zheng, Enumeration of fusenes to $h = 20$; D. Cvetković, Characterizing properties of some graph invariants related to electron charges in the Hückel molecular orbital theory; O. D. Friedrichs, Fast embeddings for planar molecular graphs; O. D. Friedrichs and M. Deza, More icosahedral fulleroids; A. Dietz, C. Fiorio, M. Habib, and C. Laurenço, Representation of stereochemistry using combinatorial maps; B. T. Fan, A. Panaye, J. H. Yao, S. G. Yuan, and J. P. Doucet, Geometric symmetry and chemical equivalence; P. W. Fowler, P. E. John, and H. Sachs, (3-6)-cages, hexagonal toroidal cages, and their spectra; P. W. Fowler, T. Pisanski, A. Graovac, and J. Žerovnik, A generalized ring spiral algorithm for coding fullerenes and other cubic polyhedra; X. Guo and M. Randić, An efficient algorithm for determining fixed bonds and normal components in a bipartite graph; R. Hefferlin, Numerical solutions of the Laplace equation in chemical spaces; S. T. Hyde and S. Ramsden, Chemical frameworks and hyperbolic tilings; A. Kerber, R. Laue, and T. Wieland, Discrete mathematics for combinatorial chemistry; R. B. King, Carbon networks on cubic infinite periodic minimal surfaces; S. Klavžar, Applications of isometric embeddings to chemical graphs; J. Malkevitch, Geometrical and combinatorial questions about fullerenes; P. G. Mezey, Topological methods of molecular shape analysis: Continuum models and discretization; H. M. Ohlenbusch, N. Rivier, T. Aste, and B. Dubertret, Random networks in two dimensions. Simulations and correlations; C. M. Quinn, D. B. Redmond, and P. W. Fowler, Group and graph theoretical perspectives on the structures of large icosahedral cages; M. Randić, X. Guo, and S. Bobst, Use of path matrices for a characterization of molecular structures; P. Rowlinson, Star sets and star complements in finite graphs: A spectral construction technique; H. Terrones and M. Terrones, Geometry and energetics of high genus fullerenes and nanotubes; P. Vismara and C. Laurenço, An abstract representation for molecular graphs; J. M. Wills, The Wulff-shape of large periodic sphere packings; A. V. Zeigarnik, On hypercycles and hypercircuits in hypergraphs; F. Zhang and H. Li, On maximal energy ordering of acyclic conjugated molecules.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science

May 2000, 392 pages, Hardcover, ISBN 0-8218-0987-3, 2000 *Mathematics Subject Classification*: 05C50; 92E10, **Individual member \$59**, List \$99, Institutional member \$79, Order code DIMACS-HANSEN2N

Differential Equations



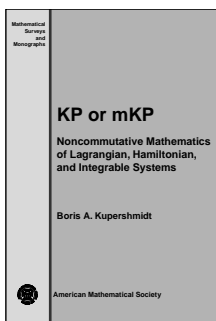
Caustics for Dissipative Semilinear Oscillations

Jean-Luc Joly, *University of Bordeaux I, Talence, France*, Guy Metivier, *University of Rennes I, France*, and Jeffrey Rauch, *University of Michigan, Ann Arbor*

Contents: Introduction; Notations and main results; L^p estimates for oscillatory integrals; Oscillations and profiles; The nonlinear interaction operators; Proof of asymptotics; Additional results and remarks; References.

Memoirs of the American Mathematical Society, Volume 144, Number 685

March 2000, 72 pages, Softcover, ISBN 0-8218-2041-9, 2000 *Mathematics Subject Classification*: 35L60, 35B05, 35G25, **Individual member \$25**, List \$41, Institutional member \$33, Order code MEMO/144/685N



KP or mKP Noncommutative Mathematics of Lagrangian, Hamiltonian, and Integrable Systems

Boris A. Kupershmidt, *University of Tennessee Space Institute, Tullahoma*

This book develops a theory that can be viewed as a noncommutative counterpart of the following topics: dynamical systems in general and integrable systems in particular; Hamiltonian formalism; variational calculus, both in continuous space and discrete. The text is self-contained and includes a large number of exercises. Many different specific models are analyzed extensively and motivations for the new notions are provided.

Contents: *Continuous space-time:* The KP hierarchy; The mKP hierarchy; Between KP and mKP; Noncommutative Lagrangian formalism; Noncommutative Hamiltonian formalism; $mKP = m + KP$; The quasirelativistic KP hierarchy; The second construction of integrals of the KP hierarchy; *Discrete space-continuous time:* KP, then mKP; The noncommutative differential-difference calculus; The noncommutative Hamiltonian formalism over differential-difference; Hamiltonian formalism for discrete integrable systems of KP and mKP types; The Gibbons forms; The hydrodynamical Ansatz; Relativistic Toda lattice and related systems; *Discrete space-time:* The idea of Lax representations and its discrete-time analog; Systems of the KP type; Systems of mKP type; The Toda lattice, the relativistic Toda lattice, and related systems; *Appendices:* Complexification of Hamiltonian systems; Asymptotic expansions of Hamiltonian systems; Variational calculus over

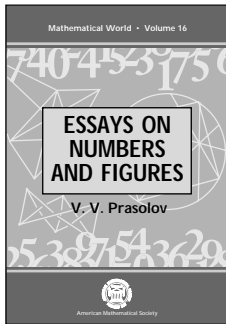
noncommutative rings; Hamiltonian correspondencies; Covariant aspects of the Hamiltonian formalism; Noncommutative solitons; The noncommutative KP equation; A list of scalar equations; Open problems and conjectures; Notes and comments; Bibliography; Index/notations.

Mathematical Surveys and Monographs

April 2000, approximately 632 pages, Hardcover, ISBN 0-8218-1400-1, 2000 *Mathematics Subject Classification*: 37J35, 37Kxx, 46L55; 35Q53, 49N45, 58J42, **Individual member \$65**, List \$109, Institutional member \$87, Order code SURV-KUPERSHMN

General and Interdisciplinary

Independent Study



Essays on Numbers and Figures

V. V. Prasolov, *Independent University of Moscow, Russia*

This is the English translation of the book originally published in Russian. It contains 20 essays, each dealing with a separate mathematical topic. The topics range from brilliant mathematical statements with interesting proofs, to simple and effective

methods of problem-solving, to interesting properties of polynomials, to exceptional points of the triangle. Many of the topics have a long and interesting history. The author has lectured on them to students worldwide.

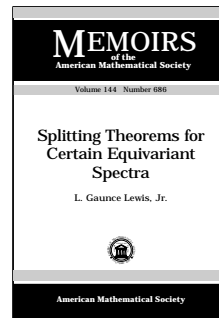
The essays are independent of one another for the most part, and each presents a vivid mathematical result that led to current research in number theory, geometry, polynomial algebra, or topology.

Contents: Conjugate numbers; Rational parametrizations of the circle; Sums of squares of polynomials; Representing numbers as the sum of two squares; Can any knot be unraveled?; Construction of a regular 17-gon; The Markov equation; Integer-valued polynomials; Chebyshev polynomials; Vectors in geometry; The averaging method and geometric inequalities; Intersection points of the diagonals of regular polygons; The chromatic polynomial of a graph; Brocard points; Diophantine equations for polynomials; The Pascal lines; One butterfly and two butterflies theorems; The Van der Waerden theorem on arithmetical progressions; Isogonal conjugate points; Cubic curves related to the triangle.

Mathematical World, Volume 16

February 2000, 75 pages, Softcover, ISBN 0-8218-1944-5, LC 99-058690, 2000 *Mathematics Subject Classification*: 00A99, **All AMS members \$12**, List \$15, Order code MAWRDL/16N

Geometry and Topology



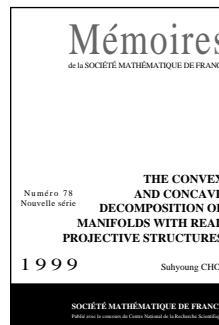
Splitting Theorems for Certain Equivariant Spectra

L. Gaunce Lewis, Jr., *Syracuse University, NY*

Contents: Introduction; Notational conventions; *Part 1. Geometrically Split Spectra*; *Part 2. A Toolkit for Incomplete Universes*; *Part 3. The Longer Proofs*; Acknowledgments; Bibliography.

Memoirs of the American Mathematical Society, Volume 144, Number 686

March 2000, 89 pages, Softcover, ISBN 0-8218-2046-X, LC 99-058330, 2000 *Mathematics Subject Classification*: 55M35, 55N91, 55P91, 57S15, 55P92; 55N20, 55Q10, 55Q91, 55R12, **Individual member \$25**, List \$42, Institutional member \$34, Order code MEMO/144/686N



The Convex and Concave Decomposition of Manifolds with Real Projective Structures

Suhyoung Choi, *Seoul National University, Korea*

A publication of Société Mathématique de France.

This volume presents the geometric properties of n -manifolds ($n \geq 2$) with geometric structures modeled on $(\mathbf{R}P^n, \text{PGL}(n+1, \mathbf{R}))$, i.e., n -manifolds with projectively flat torsion-free affine connections. The author begins by defining the notion of i -convexity of such manifolds (due to Carrière) for integers i , $1 \leq i \leq n-1$, which are generalizations of convexity. Given a real projective n -manifold M , the failure of an $(n-1)$ -convexity of M implies the existence of a certain geometric object, an n -crescent, in the completion \tilde{M} of the universal cover \tilde{M} of M . This further implies the existence of a particular type of affine submanifold in M and gives a natural decomposition of M into simpler real projective manifolds, some of which are $(n-1)$ -convex and others which are affine, more specifically concave affine. It is useful to have such a decomposition particularly in dimension three. The result will later aid in studying the geometric and topological properties of radiant affine 3-manifolds leading to their classification. The author obtains a consequence for affine Lie groups.

Distributed by the AMS in the United States, Canada, and Mexico. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France. Members of the SMF receive a 30% discount from list.

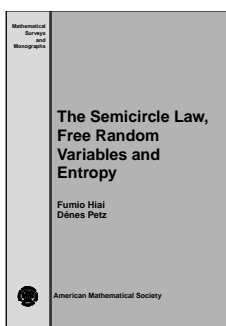
Contents: *Part I. An introduction to real projective structures:* Introduction; Convex subsets of the real projective sphere; Convex subsets in the Kuiper completions; *Part II. $(n-1)$ -convexity and decomposition:* $(n-1)$ -convexity and n -crescents;

The transversal intersection of n -crescents; Hemispheric n -crescents and two faced submanifolds; Bihedral n -crescents and two-faced submanifolds; The preservation of crescents after decomposing and splitting; The construction of concave affine manifolds; Splitting and decomposing manifolds; Left-invariant real projective structures on Lie groups; *Part III. Appendices:* A. Two miscellaneous theorems; B. Shrinking and expanding n -balls by projective maps; Frequently used symbols; Bibliography; Index.

Memoires de la Société Mathématique de France, Number 78
October 1999, 102 pages, Softcover, ISBN 2-85629-079-5,
2000 *Mathematics Subject Classification:* 57M50; 53A20, 53C15,
Individual member \$30, List \$33, Order code SMFMEM/78N

Probability

Independent Study



The Semicircle Law, Free Random Variables and Entropy

Fumio Hiai, *Tohoku University, Sendai, Japan*, and Dénes Petz, *Technical University of Budapest, Hungary*

The book treats free probability theory, which has been extensively developed since the early eighties. The emphasis is put on entropy and the random matrix model approach. It is a unique presentation demonstrating the extensive interrelation between the topics. Wigner's theorem and its broad generalizations, such as asymptotic freeness of independent matrices, are explained in detail. Consistent throughout is the parallelism between the normal and semicircle laws. The authors present Voiculescu's multivariate free entropy theory with full proofs and extend the results to unitary operators. Some applications to operator algebras are also given.

The book is the first essentially full-scale presentation on free probability theory and includes improvements of results and proofs in current literature. The combinatorial aspects of the specialized topics are emphasized; many examples are given. The book would be a suitable text for graduate courses in free probability theory.

This item will also be of interest to those working in analysis.

Contents: Overview; Probability laws and noncommutative random variables; The free relation; Analytic function theory and infinitely divisible laws; Random matrices and asymptotically free relation; Large deviations for random matrices; Free entropy of noncommutative random variables; Relation to operator algebras; Bibliography; Index.

Mathematical Surveys and Monographs

March 2000, approximately 386 pages, Hardcover, ISBN 0-8218-2081-8, 2000 *Mathematics Subject Classification:* 46L54; 15A52, 60F10, 94A17, 46N50, 60J65, 81S25, 05A17, **Individual member \$53**, List \$89, Institutional member \$71, Order code SURV-PETZN

Previously Announced Publications

A Station Favorable to the Pursuits of Science: Primary Materials in the History of Mathematics at the United States Military Academy

Joe Albree, *Auburn University at Montgomery, AL*, and David C. Arney and V. Frederick Rickey, *United States Military Academy, West Point, NY*

This book reveals the rich collection of mathematical works located at the nation's first military school, the U.S. Military Academy at West Point. It outlines the relevant history of the Academy, discusses the mathematics department and curriculum, and describes the development of the library during the nineteenth century. A major part of this book is an annotated catalog of the more than 1300 works published between 1496 and 1915 found in the West Point library.

Mathematics and its instruction greatly influenced the development of the Academy, the technological growth of America's army, and the standards of the military profession. These events, in turn, were crucial to the overall development of mathematics, mechanics, and engineering during the nineteenth century in the United States. Three individuals played a prominent role in this chronicle: Sylvanus Thayer, Charles Davies, and Albert Church.

Listed are rare and historically valuable works in a broad range of mathematical subjects. The collection clearly shows the strong European influence on the early Academy. Also listed are numerous textbooks by West Point faculty and graduates; significant contributions were made by these writers to algebra, geometry, calculus, descriptive geometry, mechanics, surveying, and mathematics education.

This book provides an important resource for the general audience as well as for those in pursuit of more scholarly information. It contains many interesting photographs and valuable details about the West Point collection. It is a must-have for anyone interested in mathematical books and collections.

Co-published with the London Mathematical Society. Members of the LMS may order directly from the AMS at the AMS member price. The LMS is registered with the Charity Commissioners.

History of Mathematics, Volume 18

January 2000, 272 pages, Hardcover, ISBN 0-8218-2059-1, LC 99-051659, 2000 *Mathematics Subject Classification:* 01A70; 01A74, 01A90, 00A15, **Individual member \$35**, List \$59, Institutional member \$47, Order code HMATH/18RT002

New and Noteworthy

Mathematics: Frontiers and Perspectives

Vladimir Arnold, *University of Paris IX, Paris, France*, and *Steklov Mathematical Institute, Moscow, Russia*, Michael Atiyah, *University of Edinburgh, Scotland*, Peter Lax, *New York University-Courant Institute, NY*, and Barry Mazur, *Harvard University, Cambridge, MA*, Editors

The twentieth century has transformed mathematics from a cottage industry run by a few semi-amateurs into a worldwide industry run by an army of professionals ...

—from the Preface by M. Atiyah

This remarkable book is a celebration of the state of mathematics at the end of the millennium. Produced under the auspices of the International Mathematical Union (IMU), the volume was born as part of the activities observing the World Mathematical Year 2000.

The volume consists of 30 articles written by some of the most influential mathematicians of our time. Authors of 15 contributions were recognized in various years by the IMU as recipients of the Fields Medal, from K. F. Roth (Fields Medalist, 1958) to W. T. Gowers (Fields Medalist, 1998). The articles offer valuable reflections about the amazing mathematical progress we have witnessed in this century and insightful speculations about the possible development of mathematics over the next century.

Some articles formulate important problems, challenging future mathematicians. Others pay explicit homage to the famous set of Hilbert Problems posed one hundred years ago, giving enlightening commentary. Yet other papers offer a deeply personal perspective, allowing singular insight into the minds and hearts of people doing mathematics today.

Mathematics: Frontiers and Perspectives is a unique volume that pertains to a broad mathematical audience of various backgrounds and levels of interest. It offers readers true and unequalled insight into the wonderful world of mathematics at this important juncture: the turn of the millennium.

The work is one of those rare volumes that can be browsed, and if you do simply browse through it, you get a wonderful sense of mathematics today. Yet it also can be intensely studied on a detailed technical level for gaining insight into some of the great problems on which mathematicians are currently working.

Individual members of mathematical societies of the IMU member countries can purchase this volume at the AMS member price when buying directly from the AMS.

Contributors include: A. Baker, G. Wüstholtz, J. Bourgain, S.-S. Chern, A. Connes, S. K. Donaldson, W. T. Gowers, V. F. R. Jones, D. Kazhdan, F. Kirwan, P.-L. Lions, A. J. Majda, Yu. I. Manin, G. Margulis, D. McDuff, S. Mori, D. Mumford, R. Penrose, K. F. Roth, D. Ruelle, P. Sarnak, S. Smale, R. P. Stanley, C. Vafa, A. Wiles, E. Witten, S.-T. Yau, V. I. Arnold, P. D. Lax, and B. Mazur.

February 2000, 459 pages, Hardcover, ISBN 0-8218-2070-2, LC 99-047980, 2000 *Mathematics Subject Classification*: 00B10; 00B15, All AMS members \$39, List \$49, Order code MFPR002

The Arnoldfest**Proceedings of a Conference in Honour of V. I. Arnold for his Sixtieth Birthday**

Edward Bierstone, Boris Khesin, and Askold Khovanskii, *University of Toronto, ON, Canada*, and Jerrold E. Marsden, *California Institute of Technology, Pasadena*, Editors

This volume presents articles originating from invited talks at an exciting international conference held at The Fields Institute in Toronto celebrating the sixtieth birthday of the renowned mathematician, Vladimir Arnold. Experts from the world over—including several from “Arnold’s school”—gave illuminating talks and lively poster sessions. The presentations focussed on Arnold’s main areas of interest: singularity theory, the theory of curves, symmetry groups, dynamical systems, mechanics, and related areas of mathematics.

The book begins with notes of three lectures by V. Arnold given in the framework of the Institute’s Distinguished Lecturer program. The topics of the lectures are:

- From Hilbert’s Superposition Problem to Dynamical Systems
- Symplectization, Complexification, and Mathematical Trinities
- Topological Problems in Wave Propagation Theory and Topological Economy Principle in Algebraic Geometry

Arnold’s three articles include insightful comments on Russian and Western mathematics and science. Complementing the first is Jurgen Moser’s “Recollections”, concerning some of the history of KAM theory.

This item will also be of interest to those working in differential equations.

Contributors include: V. I. Arnold, J. Moser, M. S. Alber, G. G. Luther, J. E. Marsden, J. M. Robbins, E. Bierstone, P. D. Milman, J. Damon, A. Degtyarev, V. Kharlamov, W. Ebeling, S. M. Gusein-Zade, D. G. Ebin, G. Misiolek, M. H. Freedman, K. Fukaya, K. Ono, A. Gabriellov, A. B. Givental, V. V. Goryunov, S. K. Lando, H. Hofer, E. Zehnder, Yu. S. Ilyashenko, V. Yu. Kaloshin, V. M. Kharlamov, S. Yu. Orevkov, E. I. Shustin, B. Khesin, A. Rosly, A. Khovanskii, W. F. Langford, K. Zhan, E. Mukhin, A. Varchenko, S. P. Novikov, M. Rudnev, S. Wiggins, V. A. Vassiliev, V. A. Vladimirov, K. I. Ilin, S. Yakovenko, and Y. Yomdin.

Fields Institute Communications, Volume 24

January 2000, 555 pages, Hardcover, ISBN 0-8218-0945-8, LC 99-045778, 2000 *Mathematics Subject Classification*: 01A65, 14-06, 34-06, 57-06, 58-06, 76-06, 70-06, **Individual member \$60**, List \$100, Institutional member \$80, Order code FIC/24RT002

Supplementary Reading

Introduction to Mathematical Statistical Physics

R. A. Minlos, *Institute for Problems of Information Transmission, Moscow, Russia*

This book presents a mathematically rigorous approach to the main ideas and phenomena of statistical physics. The introduction addresses the physical motivation, focussing on the basic concept of modern statistical physics, that is the notion of Gibbsian random fields.

Continued

Previously Announced Publications

Properties of Gibbsian fields are analyzed in two ranges of physical parameters: “regular” (corresponding to high-temperature and low-density regimes) where no phase transition is exhibited, and “singular” (low temperature regimes) where such transitions occur.

Next, a detailed approach to the analysis of the phenomena of phase transitions of the first kind, the Pirogov-Sinai theory, is presented. The author discusses this theory in a general way and illustrates it with the example of a lattice gas with three types of particles. The conclusion gives a brief review of recent developments arising from this theory.

The volume is written for the beginner, yet advanced students will benefit from it as well. The book will serve nicely as a supplementary textbook for course study. The prerequisites are an elementary knowledge of mechanics, probability theory and functional analysis.

University Lecture Series, Volume 19

December 1999, 103 pages, Softcover, ISBN 0-8218-1337-4, LC 99-049593, 2000 *Mathematics Subject Classification*: 82-01; 82B05, **All AMS members \$19**, List \$24, Order code ULECT/19RT002

African Americans in Mathematics II

Nathaniel Dean and **Cassandra M. McZeal**, *Rice University, Houston, TX*, and **Pamela J. Williams**, *Sandia Laboratories, Livermore, CA*, Editors

This volume presents the proceedings of the Fourth Conference for African-American Researchers in the Mathematical Sciences held at the Center for Research on Parallel Computation at Rice University (Houston). The included talks and poster presentations offer a broad perspective to the critical issues involving minority participation in mathematics. The issues explored are relevant not only to African American researchers, but also to the mathematical community in general.

This volume is the second published by the AMS (see DIMACS series, volume 15) presenting expository and research papers by distinguished African American mathematicians. In addition to filling the existing gap on African American contributions to mathematics, this book provides leadership direction and role models for students.

Contributors include: E. A. Terry, P. J. Williams, A. S. El-Bakry, R. A. Tapia, R. Moten, J. E. Brown, L. Billings, J. H. Curry, V. Robins, G. M. N’guerekata, A. Fauntleroy, D. R. King, A. Nkwanta, N. Knox, K. Weems, R. Tapia, J. L. Houston, and S. W. Williams.

Contemporary Mathematics, Volume 252

January 2000, 168 pages, Softcover, ISBN 0-8218-1195-9, LC 99-053762, 2000 *Mathematics Subject Classification*: 00B15; 00B25, 01A80, **Individual member \$21**, List \$35, Institutional member \$28, Order code CONM/252RT002

Independent Study

Single Orbit Dynamics

Benjamin Weiss, *Hebrew University of Jerusalem, Israel*

This book presents the expanded notes from ten lectures given by the author at the NSF/CBMS conference held at California State University (Bakersfield). The author describes what he calls *single orbit dynamics*, which is an approach to the analysis of dynamical systems via the study of single orbits,

rather than the study of a system as a whole. He presents single orbit interpretations of several areas of topological dynamics and ergodic theory and some new applications of dynamics to graph theory.

In the concluding lectures, single orbit approaches to generalizations of the Shannon-Breiman-McMillan theorem and related problems of compression and universal coding are presented. Complete proofs and illuminating discussions are included and references for further study are given. Some of the material appears here for the first time in print.

This item will also be of interest to those working in geometry and topology.

CBMS Regional Conference Series in Mathematics, Number 95

January 2000, 113 pages, Softcover, ISBN 0-8218-0414-6, LC 99-050183, 2000 *Mathematics Subject Classification*: 22D40, 28Dxx, 60Gxx, **All AMS members \$16**, List \$20, Order code CBMS/95RT002

Thermodynamic Formalism and Holomorphic Dynamical Systems

Michel Zinsmeister

The purpose of thermodynamics and statistical physics is to understand the equilibrium of a gas or the different states of matter. To understand the strange fractal sets appearing when one iterates a quadratic polynomial is one of the goals of the theory of holomorphic dynamical systems. These two theories are strongly linked: The laws of thermodynamics happen to be an extremely powerful tool for understanding the objects of holomorphic dynamical systems. A “thermodynamic formalism” has been developed, bringing together notions that are a priori unrelated. While the deep reasons of this parallelism remain unknown, the goal of this book is to describe this formalism both from the physical and mathematical point of view in order to understand how it works and how useful it can be.

This translation is a slightly revised version of the original French edition. The main changes are in Chapters 5 and 6 and consist of clarification of some proofs and a new presentation of the basics in iteration of polynomials.

SMF members are entitled to AMS member discounts.

SMF/AMS Texts and Monographs, Volume 2

November 1999, 82 pages, Softcover, ISBN 0-8218-1948-8, LC 99-045968, 2000 *Mathematics Subject Classification*: 28Dxx, 30-XX, 80-XX, 82Bxx, **All AMS members \$15**, List \$19, Order code SMFAMS/2RT002