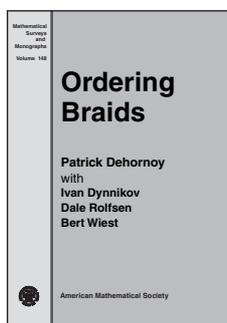


New Publications Offered by the AMS

To subscribe to email notification of new AMS publications, please go to <http://www.ams.org/bookstore-email>.

Algebra and Algebraic Geometry



Ordering Braids

Patrick Dehornoy, *Université de Caen, France, and Institut Universitaire de France, Paris, France*, **Ivan Dynnikov**, *Moscow State University, Russia*, **Dale Rolfsen**, *University of British Columbia, Vancouver, BC, Canada*, and **Bert Wiest**, *Université de Rennes, France*

From a review of the previous edition:

...this is a timely and very carefully written book describing important, interesting and beautiful results in this new area of research concerning braid groups. It will no doubt create much interest and inspire many more insights into these order structures.

– **Stephen P. Humphries** for *Mathematical Reviews*

In the fifteen years since the discovery that Artin's braid groups enjoy a left-invariant linear ordering, several quite different approaches have been used to understand this phenomenon. This book is an account of those approaches, which involve such varied objects and domains as combinatorial group theory, self-distributive algebra, finite combinatorics, automata, low-dimensional topology, mapping class groups, and hyperbolic geometry. The remarkable point is that all these approaches lead to the same ordering, making the latter rather canonical.

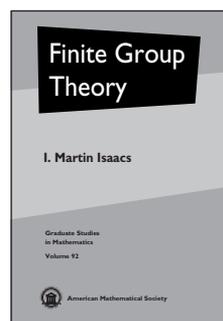
We have attempted to make the ideas in this volume accessible and interesting to students and seasoned professionals alike. Although the text touches upon many different areas, we only assume that the reader has some basic background in group theory and topology, and we include detailed introductions wherever they may be needed, so as to make the book as self-contained as possible.

The present volume follows the book, *Why are braids orderable?*, written by the same authors and published in 2002 by the Société Mathématique de France. The current text contains a considerable amount of new material, including ideas that were unknown in 2002. In addition, much of the original text has been completely rewritten, with a view to making it more readable and up-to-date.

Contents: Introduction; Braid groups; A linear ordering of braids; Applications of the braid ordering; Self-distributivity; Handle reduction; Connection with the Garside structure; Alternating decompositions; Dual braid monoids; Automorphisms of a free group; Curve diagrams; Relaxation algorithms; Triangulations; Hyperbolic geometry; The space of all braid orderings; Bi-ordering the pure braid groups; Open questions and extensions; Bibliography; Index; Key definitions; Index of notation.

Mathematical Surveys and Monographs, Volume 148

September 2008, approximately 317 pages, Hardcover, ISBN: 978-0-8218-4431-1, LC 2008009859, 2000 *Mathematics Subject Classification*: 20F36; 06F05, 06F15, 20B30, 20F34, 20F38, 57M25, 57M50, 68Q25, 68Q70, **AMS members US\$71**, List US\$89, Order code SURV/148



Finite Group Theory

I. Martin Isaacs, *University of Wisconsin-Madison, WI*

The text begins with a review of group actions and Sylow theory. It includes semidirect products, the Schur-Zassenhaus theorem, the theory of commutators, coprime actions on groups, transfer theory, Frobenius groups, primitive and multiply transitive permutation groups, the simplicity of the

PSL groups, the generalized Fitting subgroup and also Thompson's J -subgroup and his normal p -complement theorem.

Topics that seldom (or never) appear in books are also covered. These include subnormality theory, a group-theoretic proof of Burnside's theorem about groups with order divisible by just two primes, the Wielandt automorphism tower theorem, Yoshida's transfer theorem, the "principal ideal theorem" of transfer theory and many smaller results that are not very well known.

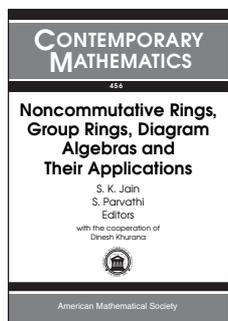
Proofs often contain original ideas, and they are given in complete detail. In many cases they are simpler than can be found elsewhere. The book is largely based on the author's lectures, and consequently, the style is friendly and somewhat informal. Finally, the book includes a large collection of problems at disparate levels of difficulty. These should enable students to practice group theory and not just read about it.

Martin Isaacs is professor of mathematics at the University of Wisconsin, Madison. Over the years, he has received many teaching awards and is well known for his inspiring teaching and lecturing. He received the University of Wisconsin Distinguished Teaching Award in 1985, the Benjamin Smith Reynolds Teaching Award in 1989, and the Wisconsin Section MAA Teaching Award in 1993, to name only a few. He was also honored by being the selected MAA Pólya Lecturer in 2003–2005.

Contents: Sylow theory; Subnormality; Split extensions; Commutators; Transfer; Frobenius actions; The Thompson subgroup; Permutation groups; More on subnormality; More transfer theory; The basics; Index.

Graduate Studies in Mathematics, Volume 92

August 2008, approximately 337 pages, Hardcover, ISBN: 978-0-8218-4344-4, LC 2008011388, 2000 *Mathematics Subject Classification*: 20B15, 20B20, 20D06, 20D10, 20D15, 20D20, 20D25, 20D35, 20D45, 20E22, 20E36, **AMS members US\$47**, List US\$59, Order code GSM/92



Noncommutative Rings, Group Rings, Diagram Algebras and Their Applications

S. K. Jain, *Ohio University, Athens, OH*, and **S. Parvathi**, *University of Madras, Chennai, India*, Editors

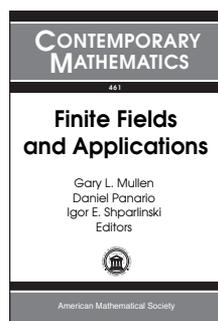
Articles in this volume are based on talks given at the International Conference on

Noncommutative Rings, Group Rings, Diagram Algebras and Their Applications. The conference provided researchers in mathematics with the opportunity to discuss new developments in these rapidly growing fields. This book contains several excellent articles, both expository and original, with new and significant results. It is suitable for graduate students and researchers interested in Ring Theory, Diagram Algebras and related topics.

Contents: **A. Facchini**, Injective modules, spectral categories, and applications; **K. Joshi**, **R. K. Sharma**, and **J. B. Srivastava**, \ast -prime and strongly prime radicals of group algebras; **A. V. Kelarev** and **D. S. Passman**, A description of incidence rings of group automata; **V. Kodiyalam**, **T. Y. Lam**, and **R. G. Swan**, Determinantal ideals, Pfaffian ideals, and the principal minor theorem; **V. Kodiyalam** and **V. S. Sunder**, Temperley-Lieb and non-crossing partition planar algebras; **T. Y. Lam**, **A. Leroy**, and **A. Ozturk**, Wedderburn polynomials over division rings, II; **P. Martin**, On diagram categories, representation theory and statistical mechanics; **M. Parvathi** and **A. Tamilselvi**, Robinson-Schensted correspondence for the G -Brauer algebras; **D. S. Passman**, Free subgroups in linear groups and group rings; **M. Sahai**, On group algebras KG with $U(KG)'$ nilpotent of class at most 2; **V. Sahai** and **S. Yadav**, On models of certain p, q -algebra representations: The p, q -algebra $U_{p,q}(su_2)$; **R. P. Sharma** and **V. S. Kapil**, Generic irreducibles of the Brauer algebras; **K. Varadarajan**, Anti Hopfian and anti co-Hopfian modules; **R. Wisbauer**, Hopf monads on categories.

Contemporary Mathematics, Volume 456

June 2008, 230 pages, Softcover, ISBN: 978-0-8218-4285-0, LC 2008005488, 2000 *Mathematics Subject Classification*: 05E10, 16N60, 16S34, 16U60, 17B37, 20C07, 20E06, 20H20, 81R50, 33D80, **AMS members US\$55**, List US\$69, Order code CONM/456



Finite Fields and Applications

Gary L. Mullen, *Pennsylvania State University, University Park, PA*, **Daniel Panario**, *Carleton University, Ottawa, Ontario, Canada*, and **Igor E. Shparlinski**, *Macquarie University, North Ryde, NSW, Australia*, Editors

This volume contains the proceedings of the Eighth International Conference on Finite Fields and Applications, held in Melbourne, Australia, July 9–13, 2007. It contains 5 invited survey papers as well as original research articles covering various theoretical and applied areas related to finite fields.

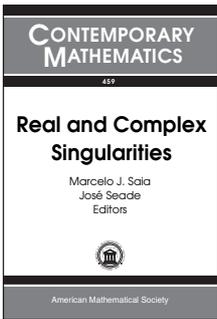
Finite fields, and the computational and algorithmic aspects of finite field problems, continue to grow in importance and interest in the mathematical and computer science communities because of their applications in so many diverse areas. In particular, finite fields now play very important roles in number theory, algebra, and algebraic geometry, as well as in computer science, statistics, and engineering. Areas of application include algebraic coding theory, cryptography, and combinatorial design theory.

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

Contents: **D. J. Bernstein** and **T. Lange**, Analysis and optimization of elliptic-curve single-scalar multiplication; **S. Boztaş**, On influences of Boolean variables and their computation; **N. Brandstätter** and **A. Winterhof**, Subsequences of Sidelnikov sequences; **R. P. Brent** and **P. Zimmermann**, A multi-level blocking distinct-degree factorization algorithm; **M. Car**, New bounds on some parameters in the Waring problem for polynomials over a finite field; **M. Cipu** and **S. D. Cohen**, Dickson polynomial permutations; **V. Deolalikar**, Ring theoretic study of linear codes using additive polynomials; **G. Effinger**, Toward a complete twin primes theorem for polynomials over finite fields; **E. El-Mahassni** and **I. E. Shparlinski**, On the distribution of the elliptic curve power generator; **A. Enge**, Discrete logarithms in curves over finite fields; **A. Garcia** and **H. Stichtenoth**, Some remarks on the Hasse-Arf theorem; **D. Gomez** and **A. Winterhof**, Character sums for sequences of iterations of Dickson polynomials; **J. Jedwab**, What can be used instead of a Barker sequence?; **A. M. Johnston**, Order dividing extension fields and the root computation problem; **P. Langevin**, **G. Leander**, and **G. McGuire**, Kasami bent functions are not equivalent to their duals; **E. Orozco**, Reduced linear modular systems; **N. Pinnawala** and **A. Rao**, Cocyclic Butson Hadamard matrices and codes over \mathbb{Z}_n via the trace map; **I. M. Rubio**, **G. L. Mullen**, **C. Corrada**, and **F. N. Castro**, Dickson permutation polynomials that decompose in cycles of the same length; **V. K. Murty** and **K. W. Shum**, Equidistribution of roots of L -function of Gold exponential sum; **H. Tapia-Recillas**, The simplex code over Galois rings; **J. A. Thas**, Finite fields and Galois geometries.

Contemporary Mathematics, Volume 461

August 2008, 265 pages, Softcover, ISBN: 978-0-8218-4309-3, 2000 *Mathematics Subject Classification*: 11Txx, **AMS members US\$63**, List US\$79, Order code CONM/461



Real and Complex Singularities

Marcelo J. Saia, *Universidade de São Paulo, São Carlos, S.P., Brazil*, and **José Seade**, *Universidad Nacional Autónoma de México, Cuernavaca, Morelos, Mexico*, Editors

This book offers a selection of papers based on talks presented at the Ninth International Workshop on Real and Complex Singularities, a series of biennial workshops organized by the Singularity Theory group at São Carlos, S.P., Brazil. The papers deal with all the different topics in singularity theory and its applications, from pure singularity theory related to commutative algebra and algebraic geometry to those topics associated with various aspects of geometry to homotopy theory.

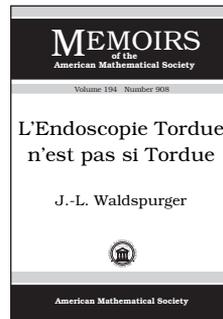
Among the topics on pure singularity theory discussed are invariants of singularities, integral closure and equisingularity, classification theory, contact structures and vector fields, and Thom polynomials. Geometric aspects deal with relations of singularity theory with topology, differential geometry and physics. Here topics discussed include the index of quadratic differential forms, obstructions in fundamental groups of plane curve complements, conjugate vectors of immersed manifolds, exotic moduli of Goursat distributions in codimension three, cobordisms of fold maps, etc. The book concludes with notes from the course on the residue theoretical approach to intersection theory.

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

Contents: **D. Dreibelbis**, Conjugate vectors of immersed manifolds; **T. Gaffney**, Invariants of $D(q, p)$ singularities; **T. Gaffney**, Nilpotents, integral closure and equisingularity conditions; **K. Houston**, Singularities in generic one-parameter complex analytic families of maps; **G. Ishikawa**, Global classification of singular curves on the symplectic plane; **V. H. Jorge Pérez**, Counting isolated singularities of a stable perturbation of a finitely \mathcal{A} -determined map-germ $\mathbb{C}^n, 0 \rightarrow (\mathbb{C}^p, 0)$ with $n < p$; **V. H. Jorge Pérez** and **A. J. Miranda**, Milnor numbers and equisingularity of map germs from \mathbb{C}^{n+3} to \mathbb{C}^3 ; **B. Kalmár**, Cobordism invariants of fold maps; **C. Leidy** and **L. Maxim**, Obstructions on fundamental groups of plane curve complements; **P. Mormul**, Exotic moduli of Goursat distributions exist already in codimension three; **A. A. du Plessis** and **C. T. C. Wall**, Hypersurfaces with isolated singularities with symmetry; **P. Pragacz**, Thom polynomials and Schur functions: Towards the singularities $A_i(-)$; **L. S. Challapa**, Index of quadratic differential forms; **J. Seade**, Remarks on contact structures and vector fields on isolated complete intersection singularities; **T. Suwa**, Residue theoretical approach to intersection theory.

Contemporary Mathematics, Volume 459

July 2008, approximately 257 pages, Softcover, ISBN: 978-0-8218-4497-7, LC 2008008196, 2000 *Mathematics Subject Classification*: 32Sxx, 53Bxx, 34Cxx, 14Cxx, **AMS members US\$63**, List US\$79, Order code CONM/459



L'Endoscopie Tordue n'est pas si Tordue

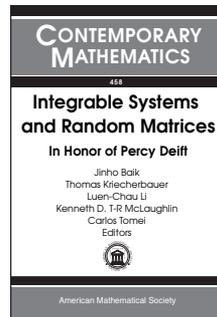
J.-L. Waldspurger, *Institut de Mathématique de Jussieu, Paris, France*

Contents: Introduction; La conjecture de transfert; Analyse harmonique; Classes de conjugaison stable et correspondances endoscopiques; Le cas non ramifié; Cas non ramifié: les preuves; Préliminaires cohomologiques; Définition des facteurs de transfert; Normalisation du facteur de transfert dans le cas non ramifié; Rapport de facteurs de transfert; Egalité de facteurs de transfert; Réduction à un sous-groupe de Lévi; Réduction à une situation non ramifiée; Réduction au cas quasi-simple; Le cas $\theta = 1$; Le cas: G^* de type A_{n-1} ; Le cas: G^* de type D_4 et θ d'ordre 3; Le cas: G^* de type D_n et θ d'ordre 2; Le cas: G^* de type E_6 et θ d'ordre 2; Appendice A: sections d'extensions; Appendice B: l'exponentielle; Bibliographie.

Memoirs of the American Mathematical Society, Volume 194, Number 908

June 2008, 261 pages, Softcover, ISBN: 978-0-8218-4469-4, LC 2008008510, 2000 *Mathematics Subject Classification*: 22E35, 22E50; 11R34, **individual member US\$52**, List US\$87, Institutional member US\$70, Order code MEMO/194/908

Analysis



Integrable Systems and Random Matrices

In Honor of Percy Deift

Jinho Baik, *University of Michigan, Ann Arbor, MI*, **Thomas Kriecherbauer**, *Ruhr-Universität Bochum, Germany*, **Luen-Chau Li**, *Pennsylvania State University, University Park, PA*,

Kenneth D. T-R McLaughlin, *University of Arizona, Tucson, AZ*, and **Carlos Tomei**, *PUC, Rio de Janeiro, Brazil*, Editors

This volume contains the proceedings of a conference held at the Courant Institute in 2006 to celebrate the 60th birthday of Percy A. Deift. The program reflected the wide-ranging contributions of Professor Deift to analysis with emphasis on recent developments in Random Matrix Theory and integrable systems. The articles in this volume present a broad view on the state of the art in these fields. Topics on random matrices include the distributions and stochastic processes associated with local eigenvalue statistics, as well as their appearance in combinatorial models such as TASEP, last passage percolation and tilings. The contributions in integrable systems mostly deal with focusing NLS, the Camassa-Holm equation and the Toda lattice. A number of papers are devoted to techniques that are used in both fields. These techniques are related to orthogonal polynomials, operator determinants, special functions, Riemann-Hilbert problems, direct and inverse spectral

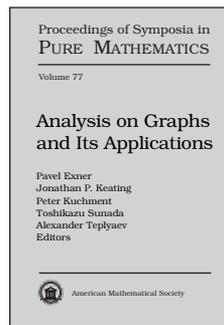
theory. Of special interest is the article of Percy Deift in which he discusses some open problems of Random Matrix Theory and the theory of integrable systems.

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

Contents: C. Tomei, Percy Deift at integer times; A. Henrici and T. Kappeler, Birkhoff normal form for the periodic toda lattice; H. Widom, Asymptotics of a class of operator determinants with application to the cylindrical toda equations; V. Y. Novokshenov, Connection formulas for the third Painlevé transcendent in the complex plane; A. S. Fokas, Nonlinear Fourier transforms and integrability in multidimensions; T. Grava and C. Klein, Numerical study of a multiscale expansion of Korteweg-de Vries and Camassa-Holm equation; A. Boutet de Monvel and D. Shepelsky, Long-time asymptotics of the Camassa-Holm equation on the line; A. Tovbis, S. Venakides, and X. Zhou, Semiclassical focusing nonlinear Schrödinger equation in the pure radiation case: Riemann-Hilbert problem approach; S. Kamvissis, From stationary phase to steepest descent; P. D. Miller, Riemann-Hilbert problems with lots of discrete spectrum; T. Kriecherbauer, A. B. J. Kuijlaars, K. D. T-R McLaughlin, and P. D. Miller, Locating the zeros of partial sums of e^z with Riemann-Hilbert methods; J. S. Geronimo and P. Iliev, Two variable deformations of the Chebyshev measure; A. Its and I. Krasovsky, Hankel determinant and orthogonal polynomials for the Gaussian weight with a jump; L. Pastur, Orthogonal polynomials, Jacobi matrices and random matrices; T. Claeys and A. B. J. Kuijlaars, Universality in unitary random matrix ensembles when the soft edge meets the hard edge; D. S. Lubinsky, A new approach to universality limits at the edge of the spectrum; P. J. Forrester, On the gap probability generating function at the spectrum edge in the case of orthogonal symmetry; M. Adler and P. van Moerbeke, An interpolation between Airy and Pearcey processes; P. L. Ferrari, The universal Airy₁ and Airy₂ processes in the totally asymmetric simple exclusion process; K. Johansson, On some special directed last-passage percolation models; E. Bachmat, Discrete spacetime and its applications; F. Colomo and A. G. Pronko, The arctic circle revisited; D. Gioev, Moduli of continuity and average decay of Fourier transforms: Two-sided estimates; R. Hempel, Eigenvalues of Schrödinger operators in gaps of the essential spectrum—An overview; J. C. Mattingly and T. M. Suidan, Transition measures for the stochastic Burgers equation; P. Deift, Some open problems in random matrix theory and the theory of integrable systems.

Contemporary Mathematics, Volume 458

June 2008, 420 pages, Softcover, ISBN: 978-0-8218-4240-9, LC 2008007009, 2000 *Mathematics Subject Classification*: 15A52, 35Q15, 35Q55, 35Q58, 37K15, 37K40, 42C05, 60K35, 60G60, **AMS members** US\$87, List US\$109, Order code CONM/458



Analysis on Graphs and Its Applications

Pavel Exner, *Academy of Sciences, Rez near Prague, Czech Republic*, **Jonathan P. Keating**, *University of Bristol, Clifton, Bristol, United Kingdom*, **Peter Kuchment**, *Texas A&M University, College Station, TX*, **Toshikazu Sunada**, *Meiji University, Kawasaki, Japan*, and **Alexander Teplyaev**, *University of Connecticut, Storrs, CT*, Editors

This book addresses a new interdisciplinary area emerging on the border between various areas of mathematics, physics, chemistry, nanotechnology, and computer science. The focus here is on problems and techniques related to graphs, quantum graphs, and fractals that parallel those from differential equations, differential geometry, or geometric analysis. Also included are such diverse topics as number theory, geometric group theory, waveguide theory, quantum chaos, quantum wire systems, carbon nano-structures, metal-insulator transition, computer vision, and communication networks.

This volume contains a unique collection of expert reviews on the main directions in analysis on graphs (e.g., on discrete geometric analysis, zeta-functions on graphs, recently emerging connections between the geometric group theory and fractals, quantum graphs, quantum chaos on graphs, modeling waveguide systems and modeling quantum graph systems with waveguides, control theory on graphs), as well as research articles.

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

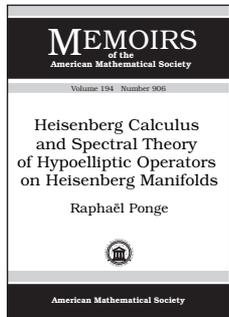
Contents: **Analysis on combinatorial graphs:** *Review articles:* R. Band, I. Oren, and U. Smilansky, Nodal domains on graphs—How to count them and why?; M. D. Horton, H. M. Stark, and A. A. Terras, Zeta functions of weighted graphs and covering graphs; T. Sunada, Discrete geometric analysis; *Research articles:* M. J. Gruber, D. H. Lenz, and I. Veselić, Uniform existence of the integrated density of states for combinatorial and metric graphs over Z^d ; D. Guido, T. Isola, and M. L. Lapidus, Bartholdi zeta functions for periodic simple graphs; M. Kelbert and Y. Suhov, Asymptotic properties of Markov processes on Cayley trees; **Analysis on fractals:** *Review articles:* V. Nekrashevych and A. Teplyaev, Groups and analysis on fractals; *Research articles:* R. Grigorchuk and Z. Šunić, Schreier spectrum of the Hanoi Towers group on three pegs; A. Grigor'yan and T. Kumagai, On the dichotomy in the heat kernel two sided estimates; M. L. Lapidus and E. P. J. Pearse, Tube formulas for self-similar fractals; R. Peirone, Existence of Eigenforms on nicely separated fractals; **Analysis on quantum graphs:** *Review articles:* J. Bolte and S. Endres, Trace formulae for quantum graphs; J. Harrison, Quantum graphs with spin Hamiltonians; J. P. Keating, Quantum graphs and quantum chaos; P. Kuchment, Quantum graphs: An introduction and a brief survey; *Research articles:* G. Berkolaiko, Two constructions of quantum graphs and two types of spectral statistics; B. M. Brown, M. S. P. Eastham, and I. G. Wood, An example on the discrete spectrum of a star graph; B. M. Brown, M. Langer, and K. M. Schmidt, The HELP inequality on trees; R. Carlson, Boundary value problems for infinite metric graphs; T. Ekholm, R. L. Frank, and H. Kovařík, Remarks about Hardy inequalities on metric trees;

Applications

H. Flechsig and **S. Gnutzmann**, On the spectral gap in Andreev graphs; **G. Freiling**, **M. Ignatiev**, and **V. Yurko**, An inverse spectral problem for Sturm-Liouville operators with singular potentials on star-type graphs; **M. J. Gruber**, **M. Helm**, and **I. Veselić**, Optimal Wegner estimates for random Schrödinger operators on metric graphs; **V. Kostrykin**, **J. Potthoff**, and **R. Schrader**, Contraction semigroups on metric graphs; **K. Pankrashkin**, Localization in a quasiperiodic model on quantum graphs; **O. Post**, Equilateral quantum graphs and boundary triples; **B. Winn**, A conditionally convergent trace formula for quantum graphs; **Applications:** *Review articles:* **S. Avdonin**, Control problems on quantum graphs; **P. Exner**, Leaky quantum graphs: A review; **D. Grieser**, Thin tubes in mathematical physics, global analysis and spectral geometry; **O. Hul**, **M. Ławniczak**, **S. Bauch**, and **L. Sirko**, Simulation of quantum graphs by microwave networks; **D. Krejčířík**, Twisting versus bending in quantum waveguides; *Research articles:* **B. Bellazzini**, **M. Burrello**, **M. Mintchev**, and **P. Sorba**, Quantum field theory on star graphs; **H. D. Cornean**, **P. Duclos**, and **B. Ricaud**, On the skeleton method and an application to a quantum scissor; **S. A. Fulling** and **J. H. Wilson**, Vacuum energy and closed orbits in quantum graphs; **P. Schapotschnikow** and **S. Gnutzmann**, Spectra of graphs and semi-conducting polymers.

Proceedings of Symposia in Pure Mathematics, Volume 77

August 2008, approximately 689 pages, Hardcover, ISBN: 978-0-8218-4471-7, LC 2008011370, 2000 *Mathematics Subject Classification:* 05C90, 11M41, 20F65, 28A80, 35-XX, 47-XX, 58-XX, 68R10, 70Q05, 78Axx, 81-XX, **AMS members US\$108**, List US\$135, Order code PSPUM/77



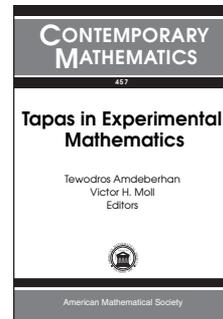
Heisenberg Calculus and Spectral Theory of Hypoelliptic Operators on Heisenberg Manifolds

Raphaël S. Ponge, *University of Toronto, ON, Canada*

Contents: Introduction; Heisenberg manifolds and their main differential operators; Intrinsic approach to the Heisenberg calculus; Holomorphic families of Ψ_{HDO} s; Heat equation and complex powers of hypoelliptic operators; Spectral asymptotics for hypoelliptic operators; Appendix A. Proof of Proposition 3.1.18; Appendix B. Proof of Proposition 3.1.21; Bibliography.

Memoirs of the American Mathematical Society, Volume 194, Number 906

June 2008, 134 pages, Softcover, ISBN: 978-0-8218-4148-8, LC 2008008508, 2000 *Mathematics Subject Classification:* 58J40, 58J50; 58J35, 32V10, 35H10, 53D10, **Individual member US\$40**, List US\$67, Institutional member US\$54, Order code MEMO/194/906



Tapas in Experimental Mathematics

Tewodros Amdeberhan, *Massachusetts Institute of Technology, Cambridge, MA*, and **Tulane University, New Orleans, LA**, and **Victor H. Moll**, *Tulane University, New Orleans, LA*, Editors

Experimental Mathematics is a recently structured field of mathematics that uses a computer and advanced computing technology as tools to perform experiments such as analysis of examples, testing of new ideas, and the search of patterns.

The development of a broad spectrum of mathematical software products such as *Mathematica*[®] and *Maple*[™] has allowed mathematicians of diverse backgrounds and interests to make the computer an essential part of their daily working environment.

This volume represents the AMS Special Session on Experimental Mathematics held in January 2007 in New Orleans. This gathering is part of an annual meeting of a growing number of scientists that have been labeled experimental mathematicians.

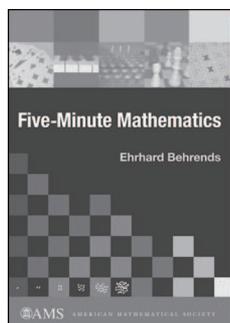
The guiding principles of the field, some of which are included in the introduction to these proceedings, are similar to those of laboratory experiments in the physical and biological sciences.

Contents: **A. Ayer** and **D. Zeilberger**, Two dimensional directed lattice walks with boundaries; **D. H. Bailey** and **J. M. Borwein**, Computer-assisted discovery and proof; **C. D. Bennett** and **E. Mosteig**, On the collection of integers that index the fixed points of maps on the space of rational functions; **B. C. Berndt**, **O.-Y. Chan**, **S.-G. Lim**, and **A. Zaharescu**, Questionable claims found in Ramanujan's lost notebook; **R. P. Boyer** and **W. M. Y. Goh**, Partition polynomials: Asymptotics and zeros; **D. M. Bradley**, Hypergeometric functions related to series acceleration formulas; **M. Chamberland**, Using integer relations algorithms for finding relationships among functions; **M. W. Coffey**, Conjecturing the optimal order of the components of the Li/Keiper constants; **S. Crass**, An experimental approach to equation-solving: Symmetry and dynamics; **E. Curry**, Multidimensional radix representations and Hot Spot Theorem; **D. Dominici**, Some properties of the inverse error function; **M. L. Glasser** and **D. Manna**, On the Laplace transform of the Psi function; **M. Kauers**, Computer algebra for special function inequalities; **M. J. Mossinghoff**, An isodiametric problem for equilateral polygons; **O. Oloa**, Some Euler-type integrals and a new rational series for Euler's constant; **A. V. Sills**, Disturbing the q -Dyson conjecture; **J. Sondow** and **K. Schalm**, Which partial sums of the Taylor series for e are convergents to e ? (and a link to the primes 2, 5, 13, 37, 463); **D. Zeilberger**, Symbol-crunching with the gambler's ruin problem.

Contemporary Mathematics, Volume 457

June 2008, 292 pages, Softcover, ISBN: 978-0-8218-4317-8, LC 2008006147, 2000 *Mathematics Subject Classification:* 05A15, 05A19, 11A63, 11Y60, 13F25, 33B20, 33C05, 33C20, 34K25, 52B55, **AMS members US\$71**, List US\$89, Order code CONM/457

General and Interdisciplinary



Five-Minute Mathematics

Ehrhard Behrends, *Freie Universität Berlin, Germany*
Translated by David Kramer

How much math can you cover in five minutes? Quite a bit, if you have a good guide. In this collection of one hundred short essays, Ehrhard Behrends offers a tour through contemporary and everyday

mathematics. The topics range from pure mathematics to applications of mathematics to observations about the mathematics that surrounds us in daily life. Here, we read about the parable of grains of rice on a chessboard, the mathematics of the lottery, music and mathematics, intriguing paradoxes, the concept of infinity, the Poincaré conjecture, quantum computers, and plenty more.

Anyone who regularly reads the science section of a newspaper or magazine will find much to enjoy in *Five-Minute Mathematics*. Behrends makes very few assumptions about his readers, other than general curiosity and some familiarity with high school mathematics.

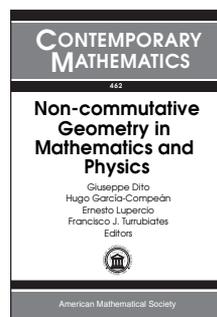
The vignettes originally appeared in the author's newspaper column. They have been extensively revised and expanded, and provided with attractive illustrations and photographs.

Contents: You can't beat the odds; Magical mathematics: The integers; How old is the captain?; Vertiginously large prime numbers; Loss plus loss equals win; When it comes to large numbers, intuition fails; The key for encryption is the telephone book; The village barber who shaves himself; Quit while you're ahead?; Can a monkey create great literature?; The birthday paradox; Horror vacui; Sufficient difficulties with the logic of mathematics are in fact a necessity; To change or not to change? The Monty Hall problem; In Hilbert's Hotel there is always a vacancy; That fascinating number pi; How random events become calculable quantities; A one-million-dollar prize: How are the prime numbers distributed?; The five-dimensional cake; One night stand; Fly me to the Moon; Using residues; Top secret!; Magical mathematics: Order amidst chaos; How does one approach genius?; On semitones and twelfth roots; Why am I always standing in the wrong line?; Zero: An undeservedly underrated number; I love to count!; Genius autodidact: The Indian mathematician Ramanujan; I hate mathematics because...; The traveling salesman: A modern odyssey; Squaring the circle; A step into the infinite; Mathematics in your CD player; The logarithm: A dying breed; Prizeworthy mathematics; Why axioms of all things?; Proof by computer?; The lottery: The small prizes; Formulas = concentrated thought; Endless growth; How do quanta compute?; Extremes!; Infinitely small?; Mathematical observations at the fire department; The first mathematical proof is 2,500 years old; There is transcendence in mathematics, though it has nothing to do with mysticism; Is every even number the sum of two primes?; Why we invert conditional probabilities incorrectly; Millionaire or billionaire?; Mathematics and chess; "The book of nature is written in the language of mathematics"; The search for Mersenne primes; Berlin, eighteenth century: A beautiful formula is discovered; The first really complicated number; $P = NP$: In mathematics, is luck sometimes unnecessary?; Happy 32nd birthday!; Buffon's needle;

Running hot and cold: Controlled cooling solves optimization problems; Who didn't pay?; What can statistics tell us?; Arbitrage; Farewell to risk: Options; Is mathematics a reflection of the world?; Mathematics that you can hear; Chance as composer; Do dice have a guilty conscience?; Strawberry ice cream can kill you!; Prosperity for all; No risk, thank you!; A Nobel Prize in mathematics?; Chance as reckoner: Monte Carlo methods; Fuzzy logic; Secret messages in the Bible?; How knotted can a knot be?; How much mathematics does a person need?; Big, bigger, biggest; It is probably correct; Is the world a crooked place?; Is there a mathematical bureau of standards?; The butterfly that fluttered by; Guaranteed to make you rich; Don't trust anyone over thirty; Equality in mathematics; Magical invariants; Mathematics goes to the movies; The lazy eight: Infinity; Books need bigger margins!; Visualizing internal organs with mathematics; A brain in the computer; Cogito, ergo sum; Does the world have a hole?; Complex numbers are not so complex as their name suggests; M. C. Escher and infinity; A one at the beginning is much more likely than a two; The Leipzig town hall and the sunflower; Information optimally packaged; Four colors suffice!; Mathematics makes billionaires; Further reading; Index.

June 2008, 380 pages, Softcover, ISBN: 978-0-8218-4348-2, LC 2007060594, 2000 *Mathematics Subject Classification*: 00A06, 00A08, **AMS members US\$28**, List US\$35, Order code MBK/53

Geometry and Topology



Non-commutative Geometry in Mathematics and Physics

Giuseppe Dito, *Université de Bourgogne, Dijon, Cedex, France*, **Hugo García-Compeán**, *CINVESTAV Unidad Monterrey, Nuevo Leon, Mexico*, **Ernesto**

Lupercio, *CINVESTAV, Mexico City, Mexico*, and **Francisco J. Turrubiates**, *Institute Politenico Nacional, Mexico City, Mexico*, Editors

This volume represents the proceedings of the conference on Topics in Deformation Quantization and Non-Commutative Structures held in Mexico City in September 2005. It contains survey papers and original contributions by various experts in the fields of deformation quantization and non-commutative derived algebraic geometry in the interface between mathematics and physics.

It also contains an article based on the XI Memorial Lectures given by M. Kontsevich, which were delivered as part of the conference.

This is an excellent introductory volume for readers interested in learning about quantization as deformation, Hopf algebras, and Hodge structures in the framework of non-commutative algebraic geometry.

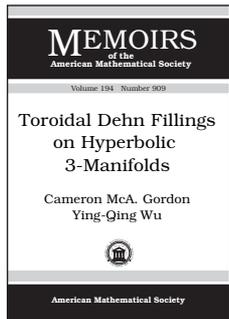
This item will also be of interest to those working in mathematical physics.

Contents: M. Kontsevich, XI Solomon Lefschetz memorial lecture series: Hodge structures in non-commutative geometry (Notes by Ernesto Lupercio); C. Blohmann, X. Tang, and A. Weinstein,

Hopfish structure and modules over irrational rotation algebras; **D. Sternheimer**, Deformations and quantizations, an introductory overview; **S. Formański** and **M. Przanowski**, SDYM and heavenly equations in deformation quantization; **O. Obregón**, **C. Ramírez**, and **M. Sabido**, On a possible construction of noncommutative topological invariants; **D. Rojas-Sandoval** and **C. Villegas-Blas**, On coherent states for spaces of holomorphic functions related to the hydrogen atom problem in dimensions $n = 2, 3, 5$; **M. Rosenbaum**, **J. D. Vergara**, and **L. R. Juárez**, Noncommutativity from canonical and noncanonical structures; **N. Vasilevski**, Commutative algebras of Toeplitz operators and Berezin quantization.

Contemporary Mathematics, Volume 462

August 2008, approximately 146 pages, Softcover, ISBN: 978-0-8218-4147-1, 2000 *Mathematics Subject Classification*: 53D55, 14A22, 47C15, 46L65, **AMS members US\$39**, List US\$49, Order code CONM/462



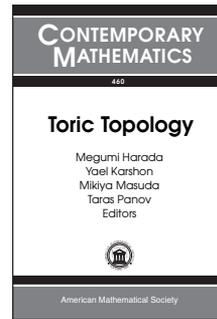
Toroidal Dehn Fillings on Hyperbolic 3-Manifolds

Cameron McA. Gordon,
University of Texas at Austin, TX,
and **Ying-Qing Wu**, *University of Iowa, Ames, IA*

Contents: Introduction; Preliminary lemmas; $\hat{\Gamma}_a^+$ has no interior vertex; Possible components of $\hat{\Gamma}_a^+$; The case $n_1, n_2 > 4$; Kleinian graphs; If $n_a = 4$, $n_b \geq 4$ and $\hat{\Gamma}_a^+$ has a small component then Γ_a is kleinian; If $n_a = 4$, $n_b \geq 4$ and Γ_b is non-positive then $\hat{\Gamma}_a^+$ has no small component; If Γ_b is non-positive and $n_a = 4$ then $n_b \leq 4$; The case $n_1 = n_2 = 4$ and Γ_1, Γ_2 non-positive; The case $n_a = 4$, and Γ_b positive; The case $n_a = 2$, $n_b \geq 3$, and Γ_b positive; The case $n_a = 2$, $n_b > 4$, Γ_1, Γ_2 non-positive, and $\max(w_1 + w_2, w_3 + w_4) = 2n_b - 2$; The case $n_a = 2$, $n_b > 4$, Γ_1, Γ_2 non-positive, and $w_1 = w_2 = n_b$; Γ_a with $n_a \leq 2$; The case $n_a = 2$, $n_b = 3$ or 4, and Γ_1, Γ_2 non-positive; Equidistance classes; The case $n_b = 1$ and $n_a = 2$; The case $n_1 = n_2 = 2$ and Γ_b positive; The case $n_1 = n_2 = 2$ and both Γ_1, Γ_2 non-positive; The main theorems; The construction of M_i as a double branched cover; The manifolds M_i are hyperbolic; Toroidal surgery on knots in S^3 ; Bibliography.

Memoirs of the American Mathematical Society, Volume 194, Number 909

June 2008, 140 pages, Softcover, ISBN: 978-0-8218-4167-9, LC 2008008511, 2000 *Mathematics Subject Classification*: 57N10, **Individual member US\$40**, List US\$67, Institutional member US\$54, Order code MEMO/194/909



Toric Topology

Megumi Harada, *McMaster University, Hamilton, Ontario, Canada*, **Yael Karshon**, *University of Toronto, Ontario, Canada*, **Mikiya Masuda**, *Osaka City University, Japan*, and **Taras Panov**, *Moscow State University, Russia*, Editors

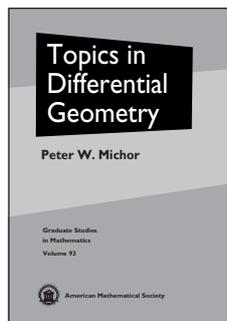
Toric topology is the study of algebraic, differential, symplectic-geometric, combinatorial, and homotopy-theoretic aspects of a particular class of torus actions whose quotients are highly structured. The combinatorial properties of this quotient and the equivariant topology of the original manifold interact in a rich variety of ways, thus illuminating subtle aspects of both the combinatorics and the equivariant topology. Many of the motivations and guiding principles of the field are provided by (though not limited to) the theory of toric varieties in algebraic geometry as well as that of symplectic toric manifolds in symplectic geometry.

This volume is the proceedings of the International Conference on Toric Topology held in Osaka in May–June 2006. It contains about 25 research and survey articles written by conference speakers, covering many different aspects of, and approaches to, torus actions, such as those mentioned above. Some of the manuscripts are survey articles, intended to give a broad overview of an aspect of the subject; all manuscripts consciously aim to be accessible to a broad reading audience of students and researchers interested in the interaction of the subjects involved. It is hoped that this volume serves as an enticing invitation to this emerging field.

Contents: **V. M. Buchstaber** and **N. Ray**, An invitation to toric topology; Vertex four of a remarkable tetrahedron; **C. Allday**, Cohomological aspects of torus actions; **D. Allen** and **J. La Luz**, A counterexample to a conjecture of Bosio and Meersseman; **M. Entov** and **L. Polterovich**, Symplectic quasi-states and semi-simplicity of quantum homology; **K. Feldman**, Miraculous cancellation and Pick's theorem; **M. Franz** and **V. Puppe**, Freeness of equivariant cohomology and mutants of compactified representations; **R. Goldin**, Weighted hyperprojective spaces and homotopy invariance in orbifold cohomology; **J. Grbić**, Homotopy theory and the complement of a coordinate subspace arrangement; **M. D. Hamilton**, The quantization of a toric manifold is given by the integer lattice points in the moment polytope; **A. Hattori**, Invariance property of orbifold elliptic genus for multi-fans; **T. S. Holm**, Act globally, compute locally: Group actions, fixed points, and localization; **T. Kajiwara**, Tropical toric geometry; **Y. Kamiyama**, The symplectic volume and intersection pairings of the moduli spaces of spatial polygons; **A. Khovanskii**, Logarithmic functional and reciprocity laws; **T. Kimura**, Orbifold cohomology reloaded; **H. Konno**, The geometry of toric hyperkähler varieties; **Z. Lü**, Graphs of 2-torus actions; **M. Masuda** and **D. Y. Suh**, Classification problems of toric manifolds via topology; **Y. Nishimura**, The quasi KO -types of certain toric manifolds; **T. E. Panov** and **N. Ray**, Categorical aspects of toric topology; **N. J. Proudfoot**, A survey of hypertoric geometry and topology; **T. Takakura**, On asymptotic partition functions for root systems; **D. Timashev**, Torus actions of complexity one; **J. S. Tymoczko**, Permutation actions on equivariant cohomology of flag varieties; **V. Uma**, K -theory of torus manifolds; **T. Yoshida**, On liftings of local torus actions to fiber bundles.

Contemporary Mathematics, Volume 460

July 2008, 401 pages, Softcover, ISBN: 978-0-8218-4486-1, LC 2008008215, 2000 *Mathematics Subject Classification*: 14Fxx, 14Lxx, 14M25, 53Dxx, 55Nxx, 55Pxx, 57Rxx, 57Sxx, **AMS members US\$87**, List US\$109, Order code CONM/460



Topics in Differential Geometry

Peter W. Michor, *Universität Wien, Austria, and Erwin Schrödinger Institut für Mathematische Physik, Wien, Austria*

This book treats the fundamentals of differential geometry: manifolds, flows,

Lie groups and their actions, invariant theory, differential forms and de Rham cohomology, bundles and connections, Riemann manifolds, isometric actions, and symplectic and Poisson geometry.

The layout of the material stresses naturality and functoriality from the beginning and is as coordinate-free as possible. Coordinate formulas are always derived as extra information. Some attractive unusual aspects of this book are as follows:

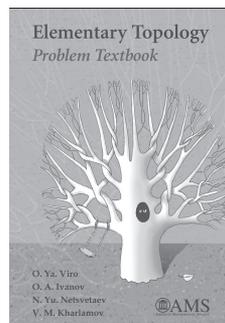
- Initial submanifolds and the Frobenius theorem for distributions of nonconstant rank (the Stefan-Sussman theory) are discussed.
- Lie groups and their actions are treated early on, including the slice theorem and invariant theory.
- De Rham cohomology includes that of compact Lie groups, leading to the study of (nonabelian) extensions of Lie algebras and Lie groups.
- The Frölicher-Nijenhuis bracket for tangent bundle valued differential forms is used to express any kind of curvature and second Bianchi identity, even for fiber bundles (without structure groups). Riemann geometry starts with a careful treatment of connections to geodesic structures to sprays to connectors and back to connections, going via the second and third tangent bundles. The Jacobi flow on the second tangent bundle is a new aspect coming from this point of view.
- Symplectic and Poisson geometry emphasizes group actions, momentum mappings, and reductions.

This book gives the careful reader working knowledge in a wide range of topics of modern coordinate-free differential geometry in not too many pages. A prerequisite for using this book is a good knowledge of undergraduate analysis and linear algebra.

Contents: Manifolds and vector fields; Lie groups and group actions; Differential forms and de Rham cohomology; Bundles and connections; Riemann manifolds; Isometric group actions or Riemann G -manifolds; Symplectic and Poisson geometry; List of symbols; Bibliography; Index.

Graduate Studies in Mathematics, Volume 93

August 2008, approximately 493 pages, Hardcover, ISBN: 978-0-8218-2003-2, LC 2008010629, 2000 *Mathematics Subject Classification*: 53-01, **AMS members US\$60**, List US\$75, Order code GSM/93



Elementary Topology Problem Textbook

O. Ya. Viro, *Stony Brook University, NY*, **O. A. Ivanov**, *Steklov Institute of Mathematics, St. Petersburg, Russia*, **N. Yu. Netsvetayev**, *St. Petersburg State University, Russia*, and **V. M. Kharlamov**, *University Louis Pasteur, Strasbourg, Cedex, France*

This textbook on elementary topology contains a detailed introduction to general topology and an introduction to algebraic topology via its most classical and elementary segment centered at the notions of fundamental group and covering space.

The book is tailored for the reader who is determined to work actively. The proofs of theorems are separated from their formulations and are gathered at the end of each chapter. This makes the book look like a pure problem book and encourages the reader to think through each formulation. A reader who prefers a more traditional style can either find the proofs at the end of the chapter or skip them altogether. This style also caters to the expert who needs a handbook and prefers formulations not overshadowed by proofs. Most of the proofs are simple and easy to discover.

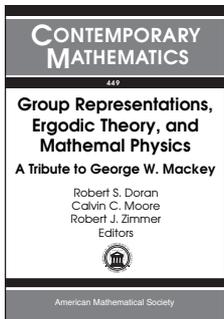
The book can be useful and enjoyable for readers with quite different backgrounds and interests. The text is structured in such a way that it is easy to determine what to expect from each piece and how to use it. There is core material, which makes up a relatively small part of the book. The core material is interspersed with examples, illustrative and training problems, and relevant discussions.

The reader who has mastered the core material acquires a strong background in elementary topology and will feel at home in the environment of abstract mathematics. With almost no prerequisites (except real numbers), the book can serve as a text for a course on general and beginning algebraic topology.

Contents: *General topology:* Structures and spaces; Continuity; Topological properties; Topological constructions; Topological algebra; *Elements of algebraic topology:* Fundamental group; Covering spaces and calculation of fundamental groups; Fundamental group and maps; Cellular techniques; Hints, comments, advices, solutions, and answers; Bibliography; Index.

September 2008, approximately 409 pages, Hardcover, ISBN: 978-0-8218-4506-6, LC 2008009303, 2000 *Mathematics Subject Classification*: 54-01, 54-00, 55-01, 55-00, 57-01, 57M05, 57M10, 57M15, **AMS members US\$47**, List US\$59, Order code MBK/54

Mathematical Physics



Group Representations, Ergodic Theory, and Mathematical Physics

A Tribute to George W. Mackey

Robert S. Doran, *Texas Christian University, Fort Worth, TX,*
Calvin C. Moore, *University of*

California, Berkeley, CA, and Robert J. Zimmer, *University of Chicago, IL,* Editors

George Mackey was an extraordinary mathematician of great power and vision. His profound contributions to representation theory, harmonic analysis, ergodic theory, and mathematical physics left a rich legacy for researchers that continues today. This book is based on lectures presented at an AMS special session held in January 2007 in New Orleans dedicated to his memory. The papers, written especially for this volume by internationally known mathematicians and mathematical physicists, range from expository and historical surveys to original high-level research articles. The influence of Mackey's fundamental ideas is apparent throughout. The introductory article contains recollections from former students, friends, colleagues, and family as well as a biography describing his distinguished career as a mathematician at Harvard, where he held the Landon D. Clay Professorship of Mathematics.

Topics examined here include recent results on induced representations, virtual groups, the Mackey Machine and crossed products, representations of Baumslag-Solitar groups, the Radon transform and the heat equation, groupoids in the study of wavelets, and quantum theory. The in-depth historical surveys of Mackey's work on representation theory, ergodic theory, and physics, together with recent developments inspired by his fundamental work will be of considerable interest to both graduate students and researchers alike.

This item will also be of interest to those working in general and interdisciplinary areas.

Contents: R. S. Doran and A. Ramsay, George Mackey 1916–2006; S. Adams, Decay to zero of matrix coefficients at adjoint infinity; J. Arthur, Induced representations, intertwining operators and transfer; L. G. Brown, MASA's and certain type I closed faces of C^* -algebras; D. E. Dutkay and P. E. T. Jorgensen, A duality approach to representations of Baumslag-Solitar groups; S. Echterhoff and D. P. Williams, The Mackey machine for crossed products: Inducing primitive ideals; E. G. Effros, Classifying the unclassifiable; N. Higson, The Mackey analogy and K -theory; R. E. Howe, Some recent applications of induced representations; M. Ionescu and P. S. Muhly, Groupoid methods in wavelet analysis; A. Jaffe, Quantum theory and relativity; A. A. Kirillov, Thoughts about George Mackey and his imprimitivity theorem; C. C. Moore, Virtual groups 45 years later; F. Murnaghan, Spherical characters: The supercuspidal case; G. Ólafsson and H. Schlichtkrull, Representation theory, radon transform and the heat equation on a Riemannian symmetric space; J. A. Packer, Projective representations and the Mackey obstruction—A survey; A. Ramsay,

Virtual groups for group representations; M. A. Rieffel, A global view of equivariant vector bundles and Dirac operators on some compact homogeneous spaces; V. S. Varadarajan, George Mackey and his work on representation theory and foundations of physics.

Contemporary Mathematics, Volume 449

January 2008, 446 pages, Softcover, ISBN: 978-0-8218-4225-6, LC 2007060574, 2000 *Mathematics Subject Classification*: 22D10, 22D30, 22E50, 28A05, 43A07, 46L05, 58J60, 81-02, 81P10, 81T08, **AMS members US\$95**, List US\$119, Order code CONM/449

Number Theory

Arithmetic Groups and Their Generalizations

What, Why, and How

Lizhen Ji, *University of Michigan, Ann Arbor, MI*

In one guise or another, many mathematicians are familiar with certain arithmetic groups, such as \mathbf{Z} or $SL(n, \mathbf{Z})$. Yet, many applications of arithmetic

groups and many connections to other subjects within mathematics are less well known. Indeed, arithmetic groups admit many natural and important generalizations.

The purpose of this expository book is to explain, through some brief and informal comments and extensive references, what arithmetic groups and their generalizations are, why they are important to study, and how they can be understood and applied to many fields, such as analysis, geometry, topology, number theory, representation theory, and algebraic geometry.

It is hoped that such an overview will shed a light on the important role played by arithmetic groups in modern mathematics.

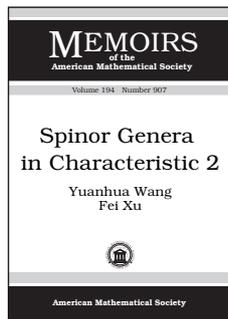
This item will also be of interest to those working in algebra and algebraic geometry and geometry and topology.

Titles in this series are co-published with International Press, Cambridge, MA.

Contents: Introduction; General comments on references; Examples of basic arithmetic groups; General arithmetic subgroups and locally symmetric spaces; Discrete subgroups of Lie groups and arithmeticity of lattices in Lie groups; Different completions of \mathbb{Q} and S -arithmetic groups over number fields; Global fields and S -arithmetic groups over function fields; Finiteness properties of arithmetic and S -arithmetic groups; Symmetric spaces, Bruhat-Tits buildings and their arithmetic quotients; Compactifications of locally symmetric spaces; Rigidity of locally symmetric spaces; Automorphic forms and automorphic representations for general arithmetic groups; Cohomology of arithmetic groups; K -groups of rings of integers and K -groups of group rings; Locally homogeneous manifolds and period domains; Non-cofinite discrete groups, geometrically finite groups; Large scale geometry of discrete groups; Tree lattices; Hyperbolic groups; Mapping class groups and outer automorphism groups of free groups; Outer automorphism group of free groups and the outer spaces; References; Index.

AMS/IP Studies in Advanced Mathematics, Volume 43

June 2008, 259 pages, Hardcover, ISBN: 978-0-8218-4675-9, LC 2008009816, 2000 *Mathematics Subject Classification*: 11F06, 22E40, **AMS members US\$47**, List US\$59, Order code AMSIP/43



Spinor Genera in Characteristic 2

Yuanhua Wang and Fei Xu,
*Chinese Academy of Sciences,
Beijing, People's Republic of
China*

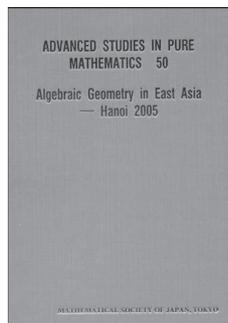
Contents: Preface; Local theory; Global theory; Bibliography.

Memoirs of the American Mathematical Society, Volume 194, Number 907

June 2008, 86 pages, Softcover, ISBN: 978-0-8218-4166-2, LC 2008008509, 2000 *Mathematics Subject Classification*: 11E08, 11E12; 20G25, 20G30, 20G35, **Individual member US\$37**, List US\$62, Institutional member US\$50, Order code MEMO/194/907

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Algebraic Geometry in East Asia—Hanoi 2005

Kazuhiro Konno, *Osaka University, Toyonaka, Japan*,
and **Viet Nguyen-Khac**, *Vietnam Information Security Lab, Hanoi, Vietnam*

This volume contains two survey articles and eight research articles contributed by the invited lecturers at the conference "Algebraic Geometry in East Asia. II", which was held at the Conference Hall (Hanoi, Vietnam) from October 10–14, 2005. Topics touched upon in this volume include Zariski pairs, rational homogeneous manifolds, Kummer surfaces, singularity theory, Cremona groups, algebraic curves, dual varieties, Castelnuovo–Weil lattices, etc. The reader can not only find the current status of a variety of research topics but also enjoy the art of the subjects presented by leading algebraic geometers.

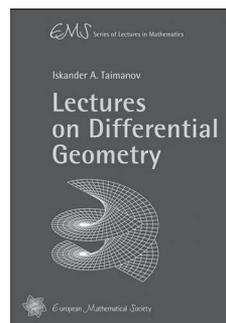
Published for the Mathematical Society of Japan by Kinokuniya, Tokyo, and distributed worldwide, except in Japan, by the AMS.

Contents: **E. A. Bartolo**, **J. I. Cogolludo**, and **H. Tokunaga**, A survey on Zariski pairs; **K. Saito**, Towards a categorical construction of Lie algebras; **M. Kuwata** and **T. Shioda**, Elliptic parameters and defining equations for elliptic fibrations on a Kummer surface; **J. Hong** and **J.-M. Hwang**, Characterization of the rational homogeneous space associated to a long simple root by its variety of minimal rational tangents; **S. Ishii**, Maximal divisorial sets in arc spaces; **V. A. Iskovskikh**, Two non-conjugate embeddings of $S_3 \times \mathbb{Z}_2$ into the Cremona group II; **C. Keem** and **A. Ohbuchi**, On the Castelnuovo–Severi inequality for a double covering; **G. Jiang**, **J. Yu**, and **J. Zhang**, Poincaré polynomial of a class of signed complete graphic arrangements; **I. Shimada**, Singularities of dual varieties in characteristic 2; **V. Nguyen-Khac** and **T. Shioda**, On the Castelnuovo–Weil lattices, I.

Advanced Studies in Pure Mathematics, Volume 50

February 2008, 344 pages, Hardcover, ISBN: 978-4-931469-45-7, 2000 *Mathematics Subject Classification*: 14-06; 14H50, 20F36, 14Bxx, 14G32, 53C15, 32M10, 14J45, 14J27, 14J28, 14J17, 14E07, 14H30, 52C35, 06C05, 05C22, 14B05, 14C20, 11G30, 11G10, **AMS members US\$42**, List US\$53, Order code ASPM/50

Geometry and Topology



Lectures on Differential Geometry

Iskander A. Taimanov, *Sobolev Institute of Mathematics, Novosibirsk, Russia*

Differential geometry studies geometrical objects using analytical methods. Like modern analysis itself, differential geometry originates in classical mechanics. For instance, geodesics and minimal

surfaces are defined via variational principles and the curvature of a curve is easily interpreted as the acceleration with respect to the path length parameter. Modern differential geometry in its turn strongly contributed to modern physics.

This book gives an introduction to the basics of differential geometry, keeping in mind the natural origin of many geometrical quantities, as well as the applications of differential geometry and its methods to other sciences.

The text is divided into three parts. The first part covers the basics of curves and surfaces, while the second part is designed as an introduction to smooth manifolds and Riemannian geometry. In particular, Chapter 5 contains short introductions to hyperbolic geometry and geometrical principles of special relativity theory. Here, only a basic knowledge of algebra, calculus and ordinary differential equations is required. The third part is more advanced and introduces into matrix Lie groups and Lie algebras the representation theory of groups, symplectic and Poisson geometry, and applications of complex analysis in surface theory.

The book is based on lectures the author held regularly at Novosibirsk State University. It is addressed to students as well as anyone who wants to learn the basics of differential geometry.

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

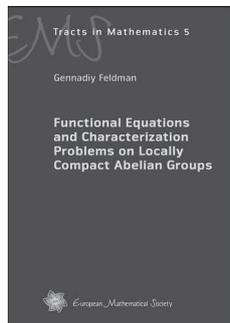
A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.

Contents: *Part I. Curves and surfaces:* Theory of curves; Theory of surfaces; *Part II. Riemannian geometry:* Smooth manifolds; Riemannian manifolds; The Lobachevskii plane and the Minkowski space; *Part III. Supplement chapters:* Minimal surfaces and complex analysis; Elements of Lie group theory; Elements of representation theory; Elements of Poisson and symplectic geometry; Bibliography; Index.

EMS Series of Lectures in Mathematics

April 2008, 219 pages, Softcover, ISBN: 978-3-03719-050-0, 2000 *Mathematics Subject Classification:* 53-01, 20C05, 20G20, 37J05, 37J35, 53A10, 53D05, 53D17, 57S17, 58A05, **AMS members US\$35**, List US\$44, Order code EMSSERLEC/7

Probability



Functional Equations and Characterization Problems on Locally Compact Abelian Groups

Gennadiy Feldman, *Institute for Low Temperature Physics and Engineering, Kharkov, Ukraine*

This book deals with the characterization of probability distributions. It is well known that both the sum and the difference of two Gaussian independent random variables with equal variance are independent as well. The converse statement was proved independently by M. Kac and S. N. Bernstein. This result is a famous example of a characterization theorem. In general, characterization problems in mathematical statistics are statements in which the description of possible distributions of random variables follows from properties of some functions in these variables.

In recent years, a great deal of attention has been focused upon generalizing the classical characterization theorems to random variables with values in various algebraic structures such as locally compact Abelian groups, Lie groups, quantum groups, or symmetric spaces. The present book is aimed at the generalization of some well-known characterization theorems to the case of independent random variables taking values in a locally compact Abelian group X . The main attention is paid to the characterization of the Gaussian and the idempotent distribution (group analogs of the Kac–Bernstein, Skitovich–Darmois, and Heyde theorems). The solution of the corresponding problems is reduced to the solution of some functional equations in the class of continuous positive definite functions defined on the character group of X . Group analogs of the Cramér and Marcinkiewicz theorems are also studied.

The author is an expert in algebraic probability theory. His comprehensive and self-contained monograph is addressed to mathematicians working in probability theory on algebraic structures, abstract harmonic analysis, and functional equations. The book concludes with comments and unsolved problems that provide further stimulation for future research in the theory.

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

A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.

Contents: Preliminaries; Gaussian distributions on locally compact Abelian groups; The Kac–Bernstein theorem for locally compact Abelian groups; The Skitovich–Darmois theorem for locally compact Abelian groups (the characteristic functions of random variables do not vanish); The Skitovich–Darmois theorem for locally compact Abelian groups (the general case); The Heyde theorem for locally compact Abelian groups; Appendix. The Kac–Bernstein and Skitovich–Darmois functional equations on locally compact Abelian groups; Comments and unsolved problems; Bibliography; Symbol index; Subject index.

EMS Tracts in Mathematics

May 2008, 268 pages, Hardcover, ISBN: 978-3-03719-045-6, 2000 *Mathematics Subject Classification:* 60-02, 60B15, 62E10, 43A05, 43A25, 32A35, 39B52, **AMS members US\$62**, List US\$78, Order code EMSTM/5