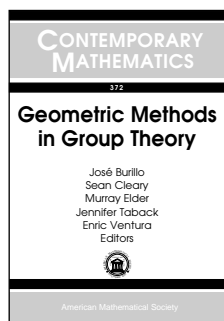


New Publications Offered by the AMS

Algebra and Algebraic Geometry



Geometric Methods in Group Theory

José Burillo, *Universitat Politècnica de Catalunya, Barcelona, Spain*, **Sean Cleary**, *The City College of New York (CUNY)*, **Murray Elder**, *University of St. Andrews, Fife, Scotland*, **Jennifer Taback**, *Bowdoin College, Brunswick, ME*, and **Enric Ventura**, *Universitat Politècnica de Catalunya, Barcelona, Spain*, Editors

ME, and **Enric Ventura**, *Universitat Politècnica de Catalunya, Barcelona, Spain*, Editors

This volume presents articles by speakers and participants in two AMS special sessions, Geometric Group Theory and Geometric Methods in Group Theory, held respectively at Northeastern University (Boston, MA) and at Universidad de Sevilla (Spain). The expository and survey articles in the book cover a wide range of topics, making it suitable for researchers and graduate students interested in group theory.

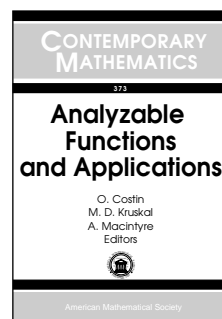
Contents: **M. Cárdenas** and **F. F. Lasheras**, Properly 3-realizable groups: a survey; **A. Martino** and **S. O'Rourke**, Free actions on \mathbb{Z}^n -trees: a survey; **G. Levitt**, Characterizing rigid simplicial actions on trees; **J. González-Meneses**, Improving an algorithm to solve multiple simultaneous conjugacy problems in braid groups; **E. Godelle** and **L. Paris**, On singular Artin monoids; **O. Bogopolski**, A surface groups analogue of a theorem of Magnus; **V. Addepalli** and **E. C. Turner**, Shift automorphisms of finite order; **V. Shpilrain**, Counting primitive elements of a free group; **R. Weidmann**, A rank formula for amalgamated products with finite amalgam; **D. Kahrobaei**, A simple proof of a theorem of Karrass and Solitar; **S. W. Margolis**, **J. Meakin**, and **Z. Šunik**, Distortion functions and the membership problem for submonoids of groups and monoids; **J. Belk** and **K.-U. Bux**, Thompson's group F is maximally nonconvex; **S. Cleary** and **J. Taback**, Seesaw words in Thompson's group F ; **X. Martin**, Piecewise-projective representation of Thompson's group T ; **T. Dymarz**, Bijective quasi-isometries of amenable groups; **I. Bumagin**, On definitions of relatively hyperbolic groups; **G. Baumslag**, Embedding wreath-like products in finitely presented groups. I; **S. Cleary** and **J. Taback**, Metric properties of the lamplighter

group as an automata group; **F. Dahmani**, An example of non-contracting weakly branch automaton group; **A. Akhmedov**, Travelling salesman problem in groups.

Contemporary Mathematics, Volume 372

May 2005, 230 pages, Softcover, ISBN 0-8218-3362-6, LC 2004065011, 2000 *Mathematics Subject Classification*: 20-06, 20F65, 20F36, 20F10, 20E05, 20E06, 20E08, 20E26, 20E22, 57M60, All AMS members \$55, List \$69, Order code CONM/372

Analysis



Analyzable Functions and Applications

O. Costin and **M. D. Kruskal**, *Rutgers University, Piscataway, NJ*, and **A. Macintyre**, *University of London, UK*, Editors

The theory of analyzable functions is a technique used to study a wide class

of asymptotic expansion methods and their applications in analysis, difference and differential equations, partial differential equations and other areas of mathematics.

Key ideas in the theory of analyzable functions were laid out by Euler, Cauchy, Stokes, Hardy, E. Borel, and others. Then in the early 1980s, this theory took a great leap forward with the work of J. Écalle. Similar techniques and concepts in analysis, logic, applied mathematics and surreal number theory emerged at essentially the same time and developed rapidly through the 1990s. The links among various approaches soon became apparent and this body of ideas is now recognized as a field of its own with numerous applications.

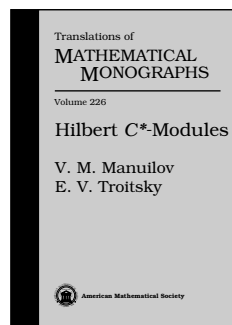
This volume stemmed from the International Workshop on Analyzable Functions and Applications held in Edinburgh (Scotland). The contributed articles, written by many leading experts, are suitable for graduate students and researchers interested in asymptotic methods.

Contents: **S. Ait-Mokhtar**, A singularly perturbed Riccati equation; **T. Aoki**, **T. Kawai**, **T. Koike**, and **Y. Takei**, On global aspects of exact WKB analysis of operators admitting infinitely many phases; **M. Aschenbrenner** and **L. van den Dries**,

Asymptotic differential algebra; **W. Balsler** and **V. Kostov**, Formally well-posed Cauchy problems for linear partial differential equations with constant coefficients; **F. Blais**, **R. Moussu**, and **J.-P. Rolin**, Non-oscillating integral curves and o-minimal structures; **B. Braaksma** and **R. Kuik**, Asymptotics and singularities for a class of difference equations; **O. Costin**, Topological construction of transseries and introduction to generalized Borel summability; **E. Delabaere**, Addendum to the hyperasymptotics for multidimensional Laplace integrals; **F. Diener** and **M. Diener**, Higher-order terms for the de Moivre-Laplace theorem; **J. Ecalle**, Twisted resurgence monomials and canonical-spherical synthesis of local objects; **A. Fruchard** and **E. Matzinger**, Matching and singularities of canard values; **B. Mudavanhu** and **R. E. O'Malley, Jr.**, On the renormalization method of Chen, Goldenfeld, and Oono; **S. P. Norton**, Generalized surreal numbers; **C. Olivé**, **D. Sauzin**, and **T. M. Seara**, Two examples of resurgence.

Contemporary Mathematics, Volume 373

May 2005, 371 pages, Softcover, ISBN 0-8218-3419-3, LC 2004062790, 2000 *Mathematics Subject Classification*: 03C64, 34M37, 34M30, 58J37, 34D15, 40G10, 39A05, **All AMS members \$71**, List \$89, Order code CONM/373



Hilbert C^* -Modules

V. M. Manuilov and **E. V. Troitsky**, *Moscow State University, Russia*

Based on lectures delivered by the authors at Moscow State University, this volume presents a detailed introduction to the theory of Hilbert C^* -modules.

Hilbert C^* -modules provide a natural generalization of Hilbert spaces arising when the field of scalars \mathbb{C} is replaced by an arbitrary C^* -algebra. The general theory of Hilbert C^* -modules appeared more than 30 years ago in the pioneering papers of W. Paschke and M. Rieffel and has proved to be a powerful tool in operator algebras theory, index theory of elliptic operators, K - and KK -theory, and in noncommutative geometry as a whole. Alongside these applications, the theory of Hilbert C^* -modules is interesting on its own.

In this book, the authors explain in detail the basic notions and results of the theory, and provide a number of important examples. Some results related to the authors' research interests are also included. A large part of the book is devoted to structural results (self-duality, reflexivity) and to nonadjointable operators.

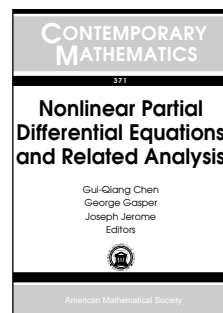
Most of the book can be read with only a basic knowledge of functional analysis; however, some experience in the theory of operator algebras makes reading easier.

Contents: Basic definitions; Operators on Hilbert modules; Hilbert modules over W^* -algebras; Reflexive Hilbert C^* -modules; Multipliers of A -compact operators. Structure results; Diagonalization of operators over C^* -algebras; Homotopy triviality of groups of invertible operators; Hilbert modules and KK -theory; Bibliography; Notation index; Index.

Translations of Mathematical Monographs, Volume 226

May 2005, 202 pages, Hardcover, ISBN 0-8218-3810-5, LC 2005042811, 2000 *Mathematics Subject Classification*: 46L08; 46Lxx, **All AMS members \$68**, List \$85, Order code MMONO/226

Differential Equations



Nonlinear Partial Differential Equations and Related Analysis

Gui-Qiang Chen, **George Gasper**, and **Joseph Jerome**, *Northwestern University, Evanston, IL*, Editors

The Emphasis Year on Nonlinear Partial Differential Equations and

Related Analysis at Northwestern University produced this fine collection of original research and survey articles. Many well-known mathematicians attended the events and submitted their contributions for this volume.

Eighteen papers comprise this work, representing the most significant advances and current trends in nonlinear PDEs and their applications. Topics covered include elliptic and parabolic equations, Navier Stokes equations, and hyperbolic conservation laws. Important applications are presented from incompressible and compressible fluid mechanics, combustion, and electromagnetism. Also included are articles on recent advances in statistical reliability in modeling, simulation, level set methods for image processing, shock waves, free boundaries, boundary layers, errors in numerical solutions, stability, instability, and singular limits.

The volume is suitable for researchers and graduate students interested in partial differential equations.

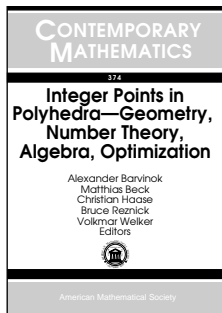
Contents: **M. Bendahmane** and **K. H. Karlsen**, Uniqueness of entropy solutions for doubly nonlinear anisotropic degenerate parabolic equations; **A. Bertozzi**, **J. Greer**, **S. Osher**, and **K. Vixie**, Nonlinear regularizations of TV based PDEs for image processing; **J. L. Bona** and **V. V. Varlamov**, Wave generation by a moving boundary; **G.-Q. Chen** and **K. Trivisa**, Analysis on models for exothermically reacting, compressible flows with large discontinuous initial data; **P. Constantin**, Eulerian-Lagrangian hydrodynamic equations; **P. Degond**, **F. Méhats**, and **C. Ringhofer**, Quantum hydrodynamic models derived from the entropy principle; **E. Feireisl**, Mathematics of viscous, compressible, and heat conducting fluids; **A. Friedman**, Symmetry-breaking bifurcations for free boundary problems; **J. Glimm**, **J. W. Grove**, **Y. Kang**, **T. Lee**, **X. Li**, **D. H. Sharp**, **K. Q. Ye**, **Y. Yu**, and **M. Zhao**, Errors in numerical solutions of spherically symmetric shock physics problems; **P.-E. Jabin** and **C. Klingenberg**, Existence to solutions of a kinetic aerosol model; **J. W. Jerome**, Functional analytic methods for evolution systems; **Y. Li**, Stability of Riemann solutions with large oscillation for the Euler equations; **Z. Lin**, Some recent results on instability of ideal plane flows; **A. Rousseau**, **R. Temam**, and **J. Tribbia**, Boundary conditions for an ocean related system with a small parameter; **D. Serre**, A remark on Y. Brenier's approach to

Born-Infeld electro-magnetic fields; **R. Shvydkoy** and **S. Friedlander**, On recent developments in the spectral problem for the linearized Euler equation; **K. Song**, Transonic flow arising from 2-D Riemann problems; **X. Wang**, A note on long-time behavior of solutions to the Boussinesq system at large Prandtl number.

Contemporary Mathematics, Volume 371

March 2005, 321 pages, Softcover, ISBN 0-8218-3533-5, LC 2004062338, 2000 *Mathematics Subject Classification*: 35-06, 35-02, 35A05, 35B05, 65M12, 65N12, 76N10, 76P05, 76D03, 76B03, **All AMS members \$71**, List \$89, Order code CONM/371

Discrete Mathematics and Combinatorics



Integer Points in Polyhedra — Geometry, Number Theory, Algebra, Optimization

Alexander Barvinok, *University of Michigan, Ann Arbor*, **Matthias Beck**, *San Francisco State University*, **Christian Haase**, *Duke*

University, Durham, NC, **Bruce Reznick**, *University of Illinois at Urbana-Champaign*, and **Volkmar Welker**, *Philipps-Universität Marburg, Germany*, Editors

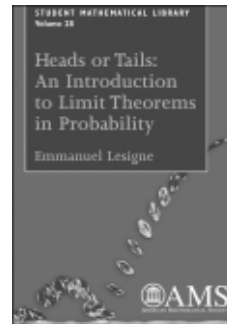
The AMS-IMS-SIAM Summer Research Conference on Integer Points in Polyhedra took place in Snowbird (UT). This proceedings volume contains original research and survey articles stemming from that event. Topics covered include commutative algebra, optimization, discrete geometry, statistics, representation theory, and symplectic geometry. The book is suitable for researchers and graduate students interested in combinatorial aspects of the above fields.

Contents: **J. Agapito**, A weighted version of quantization commutes with reduction for a toric manifold; **M. Beck**, **J. A. De Loera**, **M. Develin**, **J. Pfeifle**, and **R. P. Stanley**, Coefficients and roots of Ehrhart polynomials; **B. Chen**, Ehrhart polynomials of lattice polyhedral functions; **Y. Chen**, **I. Dinwoodie**, **A. Dobra**, and **M. Huber**, Lattice points, contingency tables, and sampling; **C. Cochet**, Kostka numbers and Littlewood-Richardson coefficients; **C. Haase**, Polar decomposition and Brion's theorem; **P. Hersh** and **V. Welker**, Gröbner basis degree bounds on $\text{Tor}_k^{k[A]}(k, k)$, and discrete Morse theory for posets; **J. B. Lasserre**, Integer programming duality and superadditive functions; **F. Santos**, The Cayley trick and triangulations of products of simplices; **M. Beck**, **B. Chen**, **L. Fukshansky**, **C. Haase**, **A. Knutson**, **B. Reznick**, **S. Robins**, and **A. Schürmann**, Problems from the Cottonwood Room.

Contemporary Mathematics, Volume 374

June 2005, 191 pages, Softcover, ISBN 0-8218-3459-2, LC 2005040968, 2000 *Mathematics Subject Classification*: 52B20; 05A15, 11H06, 11P21, 13P10, 14M25, 52C07, 62H17, 68W30, 90C10, **All AMS members \$47**, List \$59, Order code CONM/374

Probability



Heads or Tails: An Introduction to Limit Theorems in Probability

Emmanuel Lesigne, *Université François Rabelais, Tours, France*

Everyone knows some of the basics of probability, perhaps enough to play cards. Beyond the introductory ideas, there are many wonderful results that are unfamiliar to the layman, but which are well within our grasp to understand and appreciate. Some of the most remarkable results in probability are those that are related to limit theorems—statements about what happens when the trial is repeated many times. The most famous of these is the Law of Large Numbers, which mathematicians, engineers, economists, and many others use every day.

In this book, Lesigne has made these limit theorems accessible by stating everything in terms of a game of tossing of a coin: heads or tails. In this way, the analysis becomes much clearer, helping establish the reader's intuition about probability. Moreover, very little generality is lost, as many situations can be modelled from combinations of coin tosses.

This book is suitable for anyone who would like to learn more about mathematical probability and has had a one-year undergraduate course in analysis.

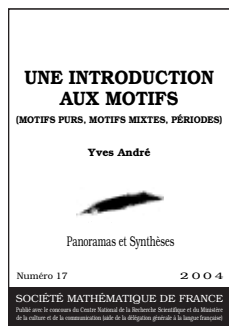
Contents: Prerequisites and overview; Modeling a probabilistic experiment; Random variables; Independence; The binomial distribution; The weak law of large numbers; The large deviations estimate; The central limit theorem; The moderate deviations estimate; The local limit theorem; The arcsine law; The strong law of large numbers; The law of the iterated logarithm; Recurrence of random walks; Epilogue; Biographies; Bibliography; Index.

Student Mathematical Library, Volume 28

June 2005, approximately 160 pages, Softcover, ISBN 0-8218-3714-1, LC 2005041058, 2000 *Mathematics Subject Classification*: 60-01, 60Fxx, **All AMS members \$23**, List \$29, Order code STML/28

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Une introduction aux motifs

Motifs purs, motifs mixtes, périodes

Yves André, *École Normale Supérieure, Paris, France*

"Motives" were introduced 40 years ago by A. Grothendieck as "a systematic theory of arithmetic properties of algebraic varieties as embodied in their

groups of classes of cycles". This text provides an exposition of the geometric foundations of the theory (pure and mixed) and a panorama of major developments that have occurred in the last 15 years. The last part is devoted to a study of *periods* of motives, with emphasis on examples (polyzeta numbers, notably). It is suitable for graduate students and research mathematicians interested in number theory.

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

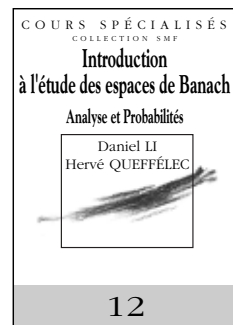
A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: *Partie I. Motifs purs:* Sources; géométrie énumérative, cohomologie, théorie de Galois; \otimes -Catégories rigides, catégories tannakiennes; Cycles algébriques et cohomologies (cas des variétés projectives lisses); Motifs purs de Grothendieck; Les conjectures standard; Groupes de Galois motiviques; Les conjectures de plénitude et de semi-simplicité des réalisations enrichies; Effectivité; Comment contourner les conjectures standard; Applications de la théorie des cycles motivés; Filtrations sur les anneaux de Chow et nilpotence; Structure de la catégorie des motifs purs pour une équivalence adéquate quelconque; Motifs purs virtuels attachés aux k -variétés (transition vers la mixité); *Partie II. Motifs mixtes:* Pourquoi des motifs mixtes?; Le formalisme élémentaire des morphismes multivalués; Motifs mixtes de Voevodsky; Twists et cohomologie motivique; Propriétés fondamentales de $DM_{\text{gm}}(k)$; Complexes de faisceaux motiviques; Exemples: 1-motifs et motifs de Tate mixtes; Vers le coeur de $DM_{\text{gm}}(k)$; Réalisations mixtes et régulateurs; *Partie III. Périodes:* Relations de périodes; Motifs et valeurs spéciales de la fonction Γ ; Motifs et nombres polyzêta; Bibliographie; Index terminologique.

Panoramas et Synthèses, Number 17

January 2005, 261 pages, Softcover, ISBN 2-85629-164-3, 2000 *Mathematics Subject Classification:* 14F42, 19E15, 32G20, 11J91, **Individual member** \$33, List \$37, Order code PASY/17

Analysis



Introduction à l'étude des espaces de Banach

Analyse et probabilités

Daniel Li, and Hervé Queffélec, *Université de Lille 1, France*

Devoted to the study of Banach spaces, this book emphasizes connections with classical analysis,

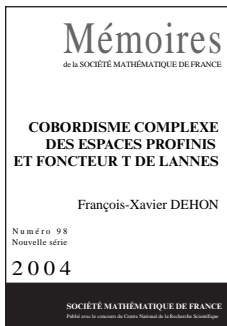
harmonic analysis, and probability theory. It is suitable for beginning graduate students. The study is taken from the beginning and then worked out thoroughly, presenting several fundamental results which were obtained during the period 1950-2000: Grothendieck's theorem, Dvoretzky's theorem, Rosenthal's dichotomy theorem, and Gowers's dichotomy theorem, etc., with applications.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: Préliminaire. Topologies faible et préfaible. Filtrés, ultrafiltres. Ordinaux; Notions fondamentales de probabilités; Bases dans les espaces de Banach; Convergence inconditionnelle; Variables aléatoires banachiques; Type et cotype des espaces de Banach. Factorisation par un espace de Hilbert; Opérateurs p -sommants. Applications; Quelques propriétés des espaces L^p ; L'espace l_1 ; Sections euclidiennes; Espaces de Banach séparables sans la propriété d'approximation; Processus gaussiens; Sous-espaces réflexifs de L^1 ; Quelques exemples d'utilisation de la méthode des sélecteurs; Espace de Pisier des fonctions presque sûrement continues. Applications; Annexe. Algèbres de Banach. Groupes abéliens compacts; Bibliographie; Index des notations; Index des noms cités; Index terminologique.

Cours Spécialisés—Collection SMF, Number 12

January 2005, 627 pages, Softcover, ISBN 2-85629-155-4, 2000 *Mathematics Subject Classification:* 42A55, 42A61, 43A46, 46B03, 46B07, 46B09, 46B15, 46B20, 46B25, 46B28, 52A21, 52A38, 60D05, 60G42, 60G46, 60G50, **Individual member** \$94, List \$104, Order code COSP/12



Geometry and Topology

Cobordisme complexe des espaces profinis et foncteur T de Lannes

François-Xavier Dehon,
Université de Nice, France

The author shows that the continuous MU-cohomology of the mapping spaces from the classifying space $B\pi$ of some commutative compact Lie group to the pro- p -completion of a space whose p -adic cohomology is torsion free is the image of the p -completed MU-cohomology of the target space by a functor $T_{B\pi}$ analogous to the functor T associated to the classifying space of the cyclic group of order p .

The book is suitable for graduate students and research mathematicians interested in geometry and topology.

A publication of the Société Mathématique de France, Marseille (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: Introduction; Cobordisme complexe des espaces profinis; Cohomologie des espaces fonctionnels de source le classifiant d'un groupe de Lie compact commutatif; Appendice; Bibliographie; Index.

Mémoires de la Société Mathématique de France, Number 98

December 2004, 138 pages, Softcover, ISBN 2-85629-162-7, 2000 *Mathematics Subject Classification*: 55Q05, 18C15, 55N22, 55R37, 55S25, 55Uxx, **Individual member \$33**, List \$37, Order code SMFMEM/98

Number Theory



Cohomologies p -adiques et applications arithmétiques (III)

Pierre Berthelot, *Université de Rennes I, France*, Jean-Marc Fontaine and Luc Illusie, *Université de Paris-Sud, Orsay, France*, Kazuya Kato, *Kyoto University, Japan*, and Michael

Rapoport, *University of Köln, Germany*, Editors

This volume contains survey papers on p -adic methods in arithmetic geometry. Topics covered include Galois representations, p -adic L -functions of modular forms, and Iwasawa theory of modular forms. The book is suitable for

graduate students and research mathematicians interested in number theory, algebra, and algebraic geometry.

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

A publication of the Société Mathématique de France, Marseille (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: J.-M. Fontaine, Arithmétique des représentations galoisiennes p -adiques; K. Kato, p -adic Hodge theory and values of zeta functions of modular forms; P. Schneider and J. Teitelbaum, Correction to " p -adic boundary values".

Astérisque, Number 295

November 2004, 300 pages, Softcover, ISBN 2-85629-158-9, 2000 *Mathematics Subject Classification*: 11F11, 11F67, 11F80, 11F85, 11G05, 11G16, 11G40, 11R33, 11R39, 11R56, 11S15, 11S20, 11S25, 11S80, 11S99, 14F30, 14F40, 14F42, 14G10, 14G35, 14G40, 22E50, **Individual member \$74**, List \$82, Order code AST/295