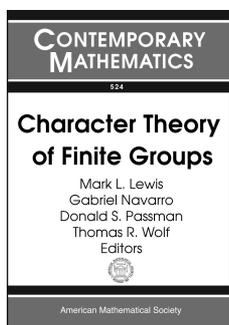


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Algebra and Algebraic Geometry



Character Theory of Finite Groups

Mark L. Lewis, *Kent State University, OH*, Gabriel Navarro, *Universitat de València, Spain*, Donald S. Passman, *University of Wisconsin, Madison, WI*, and Thomas R. Wolf, *Ohio University, Athens, OH*, Editors

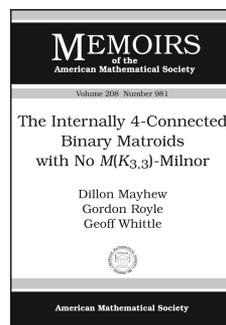
This volume contains a collection of papers from the Conference on Character Theory of Finite Groups, held at the Universitat de València, Spain, on June 3–5, 2009, in honor of I. Martin Isaacs.

The topics include permutation groups, character theory, p -groups, and group rings. The research articles feature new results on large normal abelian subgroups of p -groups, construction of certain wreath products, computing idempotents in group algebras of finite groups, and using dual pairs to study representations of cross characteristic in classical groups. The expository articles present results on vertex subgroups, measuring theorems in permutation groups, the development of super character theory, and open problems in character theory.

Contents: V. A. Belonogov, On character tables and abstract structure of finite groups; N. Boston, Large transitive groups with many elements having fixed points; J. P. Cossey, Vertex subgroups and vertex pairs in solvable groups; P. Diaconis, Threads through group theory; S. M. Gagola, Jr., Tate's theorem, and other oddities, via transfer; G. Glauberman, A p -group with no normal large abelian subgroup; A. Goren and M. Herzog, General measuring arguments for finite permutation groups; R. M. Guralnick, Commutators and wreath products; T. M. Keller, Gaps in character degrees for groups with many conjugacy classes; A. Mann, The number of subgroups of metacyclic groups; G. Navarro, Problems in character theory; T. Okuyama and T. Wada, Eigenvalues of Cartan matrices of blocks in finite groups; D. S. Passman, Character theory and group rings; G. R. Robinson, Lifting theorems and applications to group algebras; M. C. Slattery, Character degrees of normally monomial maximal class 5-groups; P. H. Tiep, Dual pairs of finite classical groups in cross characteristic.

Contemporary Mathematics, Volume 524

October 2010, 179 pages, Softcover, ISBN: 978-0-8218-4827-2, LC 2010013663, 2000 *Mathematics Subject Classification*: 20B05, 20B40, 20C05, 20C15, 20C20, 20D15, 20D20, 20F12, 60J20, **AMS members US\$55.20**, List US\$69, Order code CONM/524



The Internally 4-Connected Binary Matroids with No $M(K_{3,3})$ -Minor

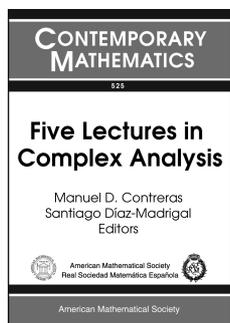
Dillon Mayhew, *Victoria University of Wellington, New Zealand*, Gordon Royle, *University of Western Australia, Crawley, Western Australia*, and Geoff Whittle, *Victoria University of Wellington, New Zealand*

Contents: Introduction; Preliminaries; Möbius matroids; From internal to vertical connectivity; An R_{12} -type matroid; A connectivity lemma; Proof of the main result; Appendix A. Case-checking; Appendix B. Sporadic matroids; Appendix C. Allowable triangles; Bibliography; Index.

Memoirs of the American Mathematical Society, Volume 208, Number 981

October 2010, 95 pages, Softcover, ISBN: 978-0-8218-4826-5, 2000 *Mathematics Subject Classification*: 05B35, **Individual member US\$40.20**, List US\$67, Institutional member US\$53.60, Order code MEMO/208/981

Analysis



Five Lectures in Complex Analysis

Manuel D. Contreras and **Santiago Díaz-Madrigal**,
Universidad de Sevilla, Spain,
Editors

This volume contains state-of-the-art survey papers in complex analysis based on lectures given at the Second Winter School on Complex Analysis and Operator

Theory held in February 2008 at the University of Sevilla, Sevilla, Spain.

Complex analysis is one of the most classical branches of mathematical analysis and is closely related to many other areas of mathematics, including operator theory, harmonic analysis, probability theory, functional analysis and dynamical systems. Undoubtedly, the interplay among all these branches gives rise to very beautiful and deep results in complex analysis and its neighboring fields. This interdisciplinary aspect of complex analysis is the central topic of this volume.

This book collects the latest advances in five significant areas of rapid development in complex analysis. The papers are: *Local holomorphic dynamics of diffeomorphisms in dimension one*, by F. Bracci, *Nonpositive curvature and complex analysis*, by S. M. Buckley, *Virasoro algebra and dynamics in the space of univalent functions*, by I. Markina and A. Vasil'ev, *Composition operators ♥ Toeplitz operators*, by J. H. Shapiro, and *Two applications of the Bergman spaces techniques*, by S. Shimorin.

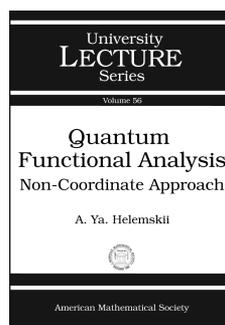
The papers are aimed, in particular, at graduate students with some experience in basic complex analysis. They might also serve as introductions for general researchers in mathematical analysis who may be interested in the specific areas addressed by the authors. Indeed, the contributions can be considered as up-to-the-minute reports on the current state of the fields, each of them including many recent results which may be difficult to find in the literature.

A co-publication of the AMS and Real Sociedad Matemática Española (RSME).

Contents: F. Bracci, Local holomorphic dynamics of diffeomorphisms in dimension one; S. M. Buckley, Nonpositive curvature and complex analysis; I. Markina and A. Vasil'ev, Virasoro algebra and dynamics in the space of univalent functions; J. H. Shapiro, Composition operators ♥ Toeplitz operators; S. Shimorin, Two applications of the Bergman spaces techniques.

Contemporary Mathematics, Volume 525

October 2010, 161 pages, Softcover, ISBN: 978-0-8218-4809-8, LC 2010014488, 2000 *Mathematics Subject Classification*: 30Cxx, 30Hxx, 30Jxx, 37Fxx, 47Bxx, 76-XX, **AMS members US\$47.20**, List US\$59, Order code CONM/525



Quantum Functional Analysis

Non-Coordinate Approach

A. Ya. Helemskii, *Moscow Lomonosov State University, Russia*

This book contains a systematic presentation of quantum functional analysis, a mathematical subject also known as operator space theory. Created in the 1980s, it nowadays is one of the most prominent areas of functional analysis, both as a field of active research and as a source of numerous important applications.

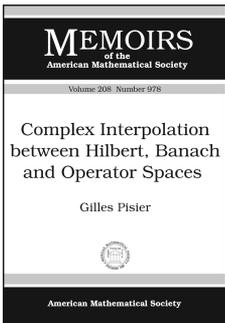
The approach taken in this book differs significantly from the standard approach used in studying operator space theory. Instead of viewing "quantized coefficients" as matrices in a fixed basis, in this book they are interpreted as finite rank operators in a fixed Hilbert space. This allows the author to replace matrix computations with algebraic techniques of module theory and tensor products, thus achieving a more invariant approach to the subject.

The book can be used by graduate students and research mathematicians interested in functional analysis and related areas of mathematics and mathematical physics. Prerequisites include standard courses in abstract algebra and functional analysis.

Contents: Three basic definitions and three principal theorems; *The beginning: Spaces and operators*: Preparing the stage; Abstract operator (= quantum) spaces; Completely bounded operators; The completion of abstract operator spaces; *Bilinear operators, tensor products and duality*: Strongly and weakly completely bounded bilinear operators; New preparations: Classical tensor products; Quantum tensor products; Quantum duality; *Principal theorems, revisited in earnest*: Extreme flatness and the extension theorem; Representation theorem and its gifts; Decomposition theorem; Returning to the Haagerup tensor product; Miscellany: More examples, facts and applications; Bibliography; Index.

University Lecture Series, Volume 56

December 2010, approximately 257 pages, Softcover, ISBN: 978-0-8218-5254-5, LC 2010023811, 2000 *Mathematics Subject Classification*: 46H25, 46L07, 47L25, **AMS members US\$40.80**, List US\$51, Order code ULECT/56



Complex Interpolation between Hilbert, Banach and Operator Spaces

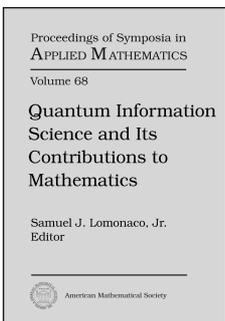
Gilles Pisier, *Texas A&M University, College Station, TX, and Université Paris VI, France*

Contents: Introduction; Preliminaries. Regular operators; Regular and fully contractive operators; Remarks on expanding graphs; A duality operators/classes of Banach spaces; Complex interpolation of families of Banach spaces; θ -Hilbertian spaces; Arcwise versus not arcwise; Fourier and Schur multipliers; A characterization of uniformly curved spaces; Extension property of regular operators; Generalizations; Operator space case; Generalizations (Operator space case); Examples with the Haagerup tensor product; References.

Memoirs of the American Mathematical Society, Volume 208, Number 978

October 2010, 78 pages, Softcover, ISBN: 978-0-8218-4842-5, 2000 *Mathematics Subject Classification*: 46B70, 47B10, 46M05, 47A80, **Individual member US\$38.40**, List US\$64, Institutional member US\$51.20, Order code MEMO/208/978

Applications



Quantum Information Science and Its Contributions to Mathematics

Samuel J. Lomonaco, Jr., *University of Maryland Baltimore County, MD*, Editor

This volume is based on lectures delivered at the 2009 AMS Short Course on Quantum Computation and Quantum Information, held January 3–4, 2009, in Washington, D.C.

Part I of this volume consists of two papers giving introductory surveys of many of the important topics in the newly emerging field of quantum computation and quantum information, i.e., quantum information science (QIS). The first paper discusses many of the fundamental concepts in QIS and ends with the curious and counter-intuitive phenomenon of entanglement concentration. The second gives an introductory survey of quantum error correction and fault tolerance, QIS's first line of defense against quantum decoherence.

Part II consists of four papers illustrating how QIS research is currently contributing to the development of new research directions in mathematics. The first paper illustrates how differential geometry can be a fundamental research tool for the development of compilers for quantum computers. The second paper gives a survey of many of the connections between quantum topology and quantum computation. The last two papers give an

overview of the new and emerging field of quantum knot theory, an interdisciplinary research field connecting quantum computation and knot theory. These two papers illustrate surprising connections with a number of other fields of mathematics.

In the appendix, an introductory survey article is also provided for those readers unfamiliar with quantum mechanics.

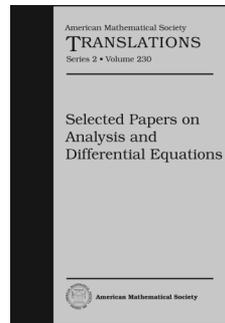
This item will also be of interest to those working in geometry and topology.

Contents: *Quantum information science:* **P. Hayden**, Concentration of measure effects in quantum information; **D. Gottesman**, An introduction to quantum error correction and fault-tolerant quantum computation; *Contributions to mathematics:* **H. E. Brandt**, Riemannian geometry of quantum computation; **L. H. Kauffman** and **S. J. Lomonaco, Jr.**, Topological quantum information theory; **S. J. Lomonaco, Jr.** and **L. H. Kauffman**, Quantum knots and mosaics; **S. J. Lomonaco, Jr.** and **L. H. Kauffman**, Quantum knots and lattices, or a blueprint for quantum systems that do rope tricks; *Appendix:* **S. J. Lomonaco, Jr.**, A Rosetta Stone for quantum mechanics with an introduction to quantum computation.

Proceedings of Symposia in Applied Mathematics, Volume 68

November 2010, approximately 345 pages, Hardcover, ISBN: 978-0-8218-4828-9, LC 2010019765, 2000 *Mathematics Subject Classification*: 81P15, 81P40, 81P45, 81P68, 68Q12, 57M25, 57M27, 20C35, **AMS members US\$71.20**, List US\$89, Order code PSAPM/68

Differential Equations



Selected Papers on Analysis and Differential Equations

This volume contains translations of papers that originally appeared in the Japanese journal *Sūgaku*. These papers range over a variety of topics in ordinary and partial differential equations and in analysis. Many of them are survey papers presenting new results obtained in the last few years.

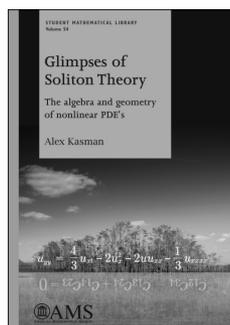
This volume is suitable for graduate students and research mathematicians interested in analysis and differential equations.

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

Contents: **K. Nakanishi**, Asymptotic analysis of nonlinear dispersive equations; **N. Hayashi**, Asymptotics of nonlinear dispersive-type evolution equations; **K. Takemura**, Heun's differential equation; **H. Isozaki**, Scattering theory and inverse problems; **Y. Komori**, Nondoubling measure and harmonic analysis; **S. Saitoh**, Theory of reproducing kernels; **H. Izeki** and **S. Nayatani**, An approach to superrigidity and fixed-point theorems via harmonic maps; **H. Sumi**, Rational semigroups, random complex dynamics and singular functions on the complex plane; **K. Oguiso**, Salem polynomials and the bimeromorphic automorphism group of a hyperkähler manifold; **S. Yamagami**, Tensor categories in operator algebras.

American Mathematical Society Translations—Series 2, Volume 230

November 2010, approximately 248 pages, Hardcover, ISBN: 978-0-8218-4881-4, LC 2010022951, 2000 *Mathematics Subject Classification*: 35-06, 37-06, 43-06, **AMS members US\$95.20**, List US\$119, Order code TRANS2/230



Glimpses of Soliton Theory

The Algebra and Geometry of Nonlinear PDEs

Alex Kasman, *College of Charleston, SC*

Solitons are explicit solutions to nonlinear partial differential equations exhibiting particle-like behavior. This is quite

surprising, both mathematically and physically. Waves with these properties were once believed to be impossible by leading mathematical physicists, yet they are now not only accepted as a theoretical possibility but are regularly observed in nature and form the basis of modern fiber-optic communication networks.

Glimpses of Soliton Theory addresses some of the hidden mathematical connections in soliton theory which have been revealed over the last half-century. It aims to convince the reader that, like the mirrors and hidden pockets used by magicians, the underlying algebro-geometric structure of soliton equations provides an elegant and surprisingly simple explanation of something seemingly miraculous.

Assuming only multivariable calculus and linear algebra as prerequisites, this book introduces the reader to the KdV Equation and its multisoliton solutions, elliptic curves and Weierstrass \wp -functions, the algebra of differential operators, Lax Pairs and their use in discovering other soliton equations, wedge products and decomposability, the KP Equation and Sato's theory relating the Bilinear KP Equation to the geometry of Grassmannians.

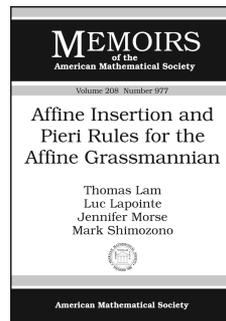
Notable features of the book include: careful selection of topics and detailed explanations to make this advanced subject accessible to any undergraduate math major, numerous worked examples and thought-provoking but not overly-difficult exercises, footnotes and lists of suggested readings to guide the interested reader to more information, and use of the software package *Mathematica*® to facilitate computation and to animate the solutions under study. This book provides the reader with a unique glimpse of the unity of mathematics and could form the basis for a self-study, one-semester special topics, or "capstone" course.

Contents: Differential equations; Developing PDE intuition; The story of solitons; Elliptic curves and KdV traveling waves; KdV n -solitons; Multiplying and factoring differential operators; Eigenfunctions and isospectrality; Lax form for KdV and other soliton equations; The KP equation and bilinear KP equation; The Grassmann cone $I_{2,4}$ and the bilinear KP equation; Pseudo-differential operators and the KP hierarchy; The Grassman cone $I_{k,n}$ and the bilinear KP hierarchy; Concluding remarks; Mathematica guide; Complex numbers; Ideas for independent projects; References; Glossary of symbols; Index.

Student Mathematical Library, Volume 54

December 2010, approximately 312 pages, Softcover, ISBN: 978-0-8218-5245-3, LC 2010024820, 2000 *Mathematics Subject Classification*: 35Q53, 37K10, 14H70, 14M15, 15A75, **AMS members US\$36.80**, List US\$46, Order code STML/54

Discrete Mathematics and Combinatorics



Affine Insertion and Pieri Rules for the Affine Grassmannian

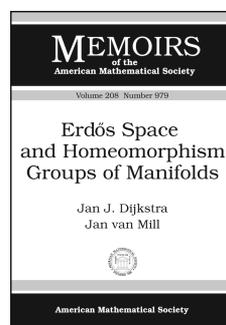
Thomas Lam, *Harvard University, Cambridge, MA*, Luc Lapointe, *Universidad de Talca, Chile*, Jennifer Morse, *Drexel University, Philadelphia, PA*, and Mark Shimozono, *Virginia Polytechnic Institute and State University, Blacksburg, VA*

Contents: Schubert bases of Gr and symmetric functions; Strong tableaux; Weak tableaux; Affine insertion and affine Pieri; The local rule $\phi_{u,v}$; Reverse local rule; Bijectivity; Grassmannian elements, cores, and bounded partitions; Strong and weak tableaux using cores; Affine insertion in terms of cores; Bibliography.

Memoirs of the American Mathematical Society, Volume 208, Number 977

October 2010, 82 pages, Softcover, ISBN: 978-0-8218-4658-2, 2000 *Mathematics Subject Classification*: 05E05, 14N15, **Individual member US\$40.20**, List US\$67, Institutional member US\$53.60, Order code MEMO/208/977

Geometry and Topology



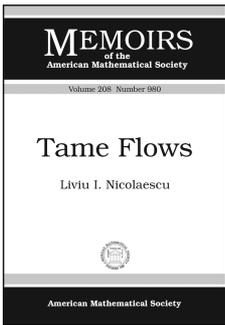
Erdős Space and Homeomorphism Groups of Manifolds

Jan J. Dijkstra and Jan van Mill, *Vrije Universiteit, Amsterdam, The Netherlands*

Contents: Introduction; Erdős space and almost zero-dimensionality; Trees and \mathbb{R} -trees; Semi-continuous functions; Cohesion; Unknotting Lelek functions; Extrinsic characterizations of Erdős space; Intrinsic characterizations of Erdős space; Factoring Erdős space; Groups of homeomorphisms; Bibliography.

Memoirs of the American Mathematical Society, Volume 208, Number 979

October 2010, 62 pages, Softcover, ISBN: 978-0-8218-4635-3, 2000 *Mathematics Subject Classification*: 57S05, **Individual member US\$34.80**, List US\$58, Institutional member US\$46.40, Order code MEMO/208/979



Tame Flows

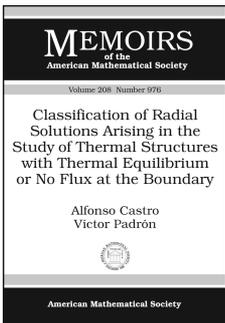
Liviu I. Nicolaescu, *University of Notre Dame, IN*

Contents: Introduction; Tame spaces; Basic properties and examples of tame flows; Some global properties of tame flows; Tame Morse flows; Tame Morse-Smale flows; The gap between two vector subspaces; The Whitney and Verdier regularity conditions; Smale transversality and Whitney regularity; The Conley index; Flips/flops and gradient like tame flows; Simplicial flows and combinatorial Morse theory; Tame currents; Appendix A. An “elementary” proof of the generalized Stokes formula; Appendix B. On the topology of tame sets; Bibliography; Index.

Memoirs of the American Mathematical Society, Volume 208, Number 980

October 2010, 130 pages, Softcover, ISBN: 978-0-8218-4870-8, 2000 *Mathematics Subject Classification*: 03C64, 06F30, 37B30, 58A07, 58A10, 58A17, 58A25, 58A35, 58E05; 55P05, 55U10, 57Q05, 57R05, **Individual member US\$41.40**, List US\$69, Institutional member US\$55.20, Order code MEMO/208/980

Mathematical Physics



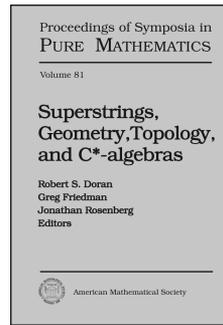
Classification of Radial Solutions Arising in the Study of Thermal Structures with Thermal Equilibrium or No Flux at the Boundary

Alfonso Castro, *Harvey Mudd College, Claremont, CA*, and Víctor Padrón, *Normandale Community College, Bloomington, MN*

Contents: Introduction; Bifurcation diagrams; Oscillation properties; Ground states; Stability of thermal structures; Proof of main theorems; The degenerate case, $k = -1$; Appendix 1. The conservative case ($N = 1$); Appendix 2. Pohozaev identity; Bibliography.

Memoirs of the American Mathematical Society, Volume 208, Number 976

October 2010, 72 pages, Softcover, ISBN: 978-0-8218-4726-8, 2000 *Mathematics Subject Classification*: 35J60, 85A25, 35K60; 80A20, 34B16, **Individual member US\$38.40**, List US\$64, Institutional member US\$51.20, Order code MEMO/208/976



Superstrings, Geometry, Topology, and C^* -algebras

Robert S. Doran and Greg Friedman, *Texas Christian University, Fort Worth, TX*, and Jonathan Rosenberg, *University of Maryland, College Park, MD*, Editors

This volume contains the proceedings of an NSF-CBMS Conference held at Texas Christian University in Fort Worth, Texas, May 18–22, 2009. The papers, written especially for this volume by well-known mathematicians and mathematical physicists, are an outgrowth of the talks presented at the conference. Topics examined are highly interdisciplinary and include, among many other things, recent results on D-brane charges in K -homology and twisted K -homology, Yang-Mills gauge theory and connections with non-commutative geometry, Landau-Ginzburg models, C^* -algebraic non-commutative geometry and ties to quantum physics and topology, the rational homotopy type of the group of unitary elements in an Azumaya algebra, and functoriality properties in the theory of C^* -crossed products and fixed point algebras for proper actions. An introduction, written by Jonathan Rosenberg, provides an instructive overview describing common themes and how the various papers in the volume are interrelated and fit together. The rich diversity of papers appearing in the volume demonstrates the current interplay between superstring theory, geometry/topology, and non-commutative geometry. The book will be of interest to graduate students, mathematicians, mathematical physicists, and researchers working in these areas.

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

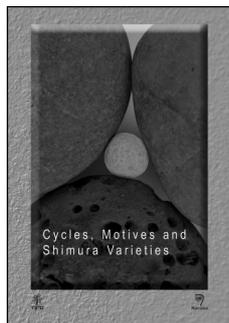
Contents: J. Rosenberg, Introduction; A. an Huef, I. Raeburn, and D. P. Williams, Functoriality of Rieffel’s generalised fixed-point algebras for proper actions; M. Ando, A. J. Blumberg, and D. Gepner, Twists of K -theory and TMF ; J. C. Baez and J. Huerta, Division algebras and supersymmetry I; P. Baum, K -homology and D-branes; A. L. Carey and B.-L. Wang, Riemann-Roch and index formulae in twisted K -theory; K. C. Hannabuss and V. Mathai, Noncommutative principal torus bundles via parametrised strict deformation quantization; S. Kang, A survey of noncommutative Yang-Mills theory for quantum Heisenberg manifolds; J. R. Klein, C. L. Schochet, and S. B. Smith, From rational homotopy to K -theory for continuous trace algebras; M. A. Rieffel, Distances between matrix algebras that converge to coadjoint orbits; H. Sati, Geometric and topological structures related to M-branes; E. Sharpe, Landau-Ginzburg models, Gerbes, and Kuznetsov’s homological projective duality.

Proceedings of Symposia in Pure Mathematics, Volume 81

November 2010, 249 pages, Hardcover, ISBN: 978-0-8218-4887-6, LC 2010027233, 2000 *Mathematics Subject Classification*: 81-06, 55-06, 46-06, 46L87, 81T30, **AMS members US\$50.40**, List US\$63, Order code PSPUM/81

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Cycles, Motives and Shimura Varieties

V. Srinivas, *Tata Institute of Fundamental Research, Mumbai, India*, Editor

This is the proceedings of the international colloquium organized by the Tata Institute of Fundamental Research in January 2008, one of a series of colloquia going back to 1956. It covers a wide spectrum

of mathematics, ranging over algebraic geometry, topology, automorphic forms, and number theory.

Algebraic cycles form the basis for the construction of motives, and conjectures about motives depend ultimately on important problems related to algebraic cycles, such as the Hodge and the Tate conjectures. Shimura varieties provide interesting, nontrivial instances of these fundamental problems. On the other hand, the motives of Shimura varieties are of great interest in automorphic forms and number theory.

This volume features refereed articles by leading experts in these fields. The articles contain original results as well as expository material.

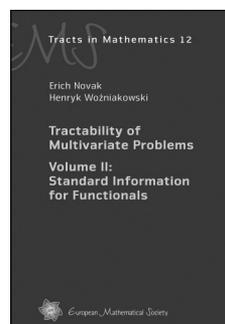
A publication of the Tata Institute of Fundamental Research. Distributed worldwide except in India, Bangladesh, Bhutan, Maldives, Nepal, Pakistan, and Sri Lanka.

Contents: D. Arapura, Mixed Hodge structures associated to geometric variations; M. Asakura and K. Sato, Beilinson's Tate conjecture for K_2 of elliptic surface: Survey and examples; E. Ghate, On the freeness of the integral cohomology groups of Hilbert-Blumenthal varieties as Hecke modules; P. Griffiths, Singularities of admissible normal functions; G. Harder, Arithmetic aspects of rank one Eisenstein cohomology; K. Kimura, A remark on the second Abel-Jacobi map; A. Krishna and V. Srinivas, Zero cycles on singular affine varieties; M. Levine, Tate motives and the fundamental group; S.-J. Kang and J. D. Lewis, Beilinson's Hodge conjecture for K_1 revisited; S. Kimura and J. P. Murre, On natural isomorphisms of finite dimensional motives and applications to the Picard motives; A. Miller, Chow motives of mixed Shimura varieties; A. Neeman, Dualizing complexes—the modern way; A. Rosenschon and V. Srinivas, The Griffiths group of the generic abelian 3-fold; R. Sreekantan, Non-Archimedean regulator maps and special values of L -functions; T. Terasoma, The Artin-Schreier DGA and the F_p -fundamental group of an F_p scheme.

Tata Institute of Fundamental Research

August 2010, 540 pages, Hardcover, ISBN: 978-81-8487-085-5, 2000 *Mathematics Subject Classification:* 14C25, 14F42, 19E15, 14G35, 11G18; 14C30, 14C35, 19F27, 11F46, 11F41, **AMS members US\$40**, List US\$50, Order code TIFR/16

Applications



Tractability of Multivariate Problems

Volume II: Standard Information for Functionals

Erich Novak, *University of Jena, Germany*, and Henryk Woźniakowski, *Columbia University, New York, NY*

This is the second volume of a three-volume set comprising a comprehensive study of the tractability of multivariate problems. The second volume deals with algorithms using standard information consisting of function values for the approximation of linear and selected nonlinear functionals. An important example is numerical multivariate integration.

The proof techniques used in volumes I and II are quite different. It is especially hard to establish meaningful lower error bounds for the approximation of functionals by using finitely many function values. Here, the concept of decomposable reproducing kernels is helpful, allowing it to find matching lower and upper error bounds for some linear functionals. It is then possible to conclude tractability results from such error bounds.

Tractability results, even for linear functionals, are very rich in variety. There are infinite-dimensional Hilbert spaces for which the approximation with an arbitrarily small error of all linear functionals requires only one function value. There are Hilbert spaces for which all nontrivial linear functionals suffer from the curse of dimensionality. This holds for unweighted spaces, where the role of all variables and groups of variables is the same. For weighted spaces one can monitor the role of all variables and groups of variables. Necessary and sufficient conditions on the decay of the weights are given to obtain various notions of tractability.

The text contains extensive chapters on discrepancy and integration, decomposable kernels and lower bounds, the Smolyak/sparse grid algorithms, lattice rules and the CBC (component-by-component) algorithms. This is done in various settings. Path integration and quantum computation are also discussed.

This volume is of interest to researchers working in computational mathematics, especially in approximation of high-dimensional problems. It is also well suited for graduate courses and seminars. There are 61 open problems listed to stimulate future research in tractability.

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

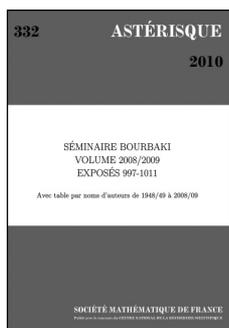
Contents: Discrepancy and integration; Worst case: General linear functionals; Worst case: Tensor products and decomposable

kernels; Worst case: Linear functionals on weighted spaces; Average case setting; Probabilistic setting; Smolyak/Sparse grid algorithms; Multivariate integration for Korobov and related spaces; Randomized setting; Nonlinear functionals; Further topics; Summary: Uniform integration for three Sobolev spaces; Appendices: List of open problems and Errata for volume I; Bibliography; Index.

EMS Tracts in Mathematics, Volume 12

June 2010, 675 pages, Hardcover, ISBN: 978-3-03719-084-5, 2000 *Mathematics Subject Classification*: 65Y20, 68Q17, 68Q25, 41A63, 65-02, 46E22, 28C20, 46E30, 11K38, 65D32, **AMS members US\$102.40**, List US\$128, Order code EMSTM/12

Number Theory



Séminaire Bourbaki

Volume 2008/2009
Exposés 997-1011

As in the preceding volumes of this seminar, at which more than one thousand talks have been presented, this volume contains fifteen survey lectures on topics of current interest: four lectures on algebraic geometry, two on analysis, one on harmonic analysis, two on probability,

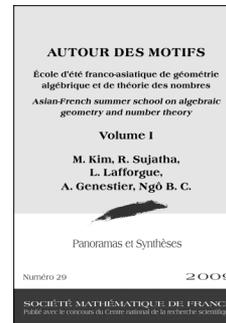
five on differentiable geometry, and one on new links between number theory and theoretical physics.

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Contents: *NOVEMBRE 2008*: **R. Cerf**, Dimères et surfaces aléatoires; **C. Favre**, Le groupe de Cremona et ses sous-groupes de type fini; **J.-F. Quint**, Convexes divisibles; **J.-P. Serre**, Le groupe de Cremona et ses sous-groupes finis; **C. Villani**, Paradoxe de Scheffer-Shnirelman revu sous l'angle de l'intégration convexe; *MARS 2009*: **D. Auroux**, La conjecture de Weinstein en dimension 3; **G. Besson**, Le théorème de la sphère différentiable; **E. Giroux**, Sur la géométrie et la dynamique des transformations de contact; **P. G. Goerss**, Topological modular forms; **T. Szamuely**, Corps de classes des schémas arithmétiques; *JUIN 2009*: **F. Barthe**, Un théorème de la limite centrale pour les ensembles convexes; **E. Breuillard**, Équidistribution des orbites toriques sur les espaces homogènes; **A. Figalli**, Regularity of optimal transport maps; **E. Frenkel**, Gauge theory and Langlands duality; **S. Maillot**, Variétés hyperboliques de petit volume; Table par noms d'auteurs.

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Autour des Motifs

Asian-French Summer
School on Algebraic
Geometry and Number
Theory: Volume 1

M. Kim, *University College London, England*, **R. Sujatha**, *Tata Institute of Fundamental Research, Mumbai, India*, **L. Lafforgue**, *Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France*, **A. Genestier**, *Université Henri Poincaré Nancy, France*, and **Ngô B. C.**, *Université Paris-Sud, Orsay, France*

This volume contains the first part of the lecture notes of the Asian-French Summer School on Algebraic Geometry and Number Theory, which was held at the Institut des Hautes Études Scientifiques (Bures-sur-Yvette) and the Université Paris-Sud XI (Orsay) in July 2006. This summer school was devoted to the theory of motives and its recent developments and to related topics, notably Shimura varieties and automorphic representations.

The contributions in this first part are expanded versions of the talks introducing the theory of motives by M. Kim and R. Sujatha, the lecture notes "Quelques remarques sur le principe de fonctorialité" by L. Lafforgue and "Lectures on Shimura varieties" by A. Genestier and Ngô B. C.

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

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Contents: **M. Kim**, Classical motives and motivic L -functions; **R. Sujatha**, Motives from a categorical point of view; **L. Lafforgue**, Quelques remarques sur le principe de fonctorialité; **A. Genestier** and **Ngô B. C.**, Lectures on Shimura varieties; References.

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