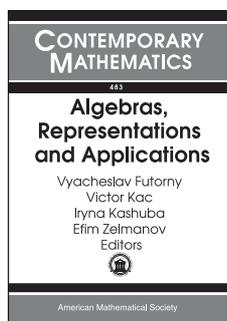


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Algebra and Algebraic Geometry



Algebras, Representations and Applications

Vyacheslav Futorny, *Universidade de São Paulo, Brazil*, **Victor Kac**, *Massachusetts Institute of Technology, Cambridge, MA*, **Iryna Kashuba**, *Universidade de São Paulo, Brazil*, and **Efim Zelmanov**, *University of California, San Diego, La Jolla, CA*, Editors

This volume contains contributions from the conference on “Algebras, Representations and Applications” (Mareias, Brazil, August 26–September 1, 2007), in honor of Ivan Shestakov’s 60th birthday.

This book will be of interest to graduate students and researchers working in the theory of Lie and Jordan algebras and superalgebras and their representations, Hopf algebras, Poisson algebras, Quantum Groups, Group Rings and other topics.

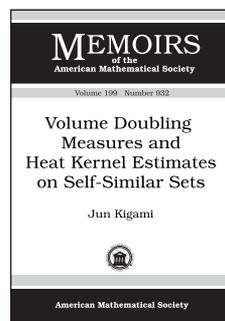
Contents: **J. Q. Adashev**, **A. K. Khuhoyberdiyev**, and **B. A. Omirov**, Classification of complex naturally graded quasi-filiform Zinbiel algebras; **H. Albuquerque** and **A. P. Santana**, Akivis superalgebras and speciality; **V. A. Artamonov** and **I. A. Chubarov**, Properties of some semisimple Hopf algebras; **Y. Bahturin** and **D. Pagon**, Classifying simple color Lie superalgebras; **V. Bekkert** and **Y. Drozd**, Derived categories for algebras with radical square zero; **P. Benito** and **F. Martín-Herce**, Tits construction, triple systems and pairs; **M. R. Bremner**, **I. R. Hentzel**, **L. A. Peresi**, and **H. Usefi**, Universal enveloping algebras of the four-dimensional Malcev algebra; **I. Cunha** and **A. Elduque**, The supermagic square in characteristic 3 and Jordan superalgebras; **W. F. Santos** and **I. L. Franco**, Monoidal categories of comodules for coquasi Hopf algebras and Radford’s formula; **E. G. Goodaire** and **C. P. Milies**, Group identities on symmetric units in alternative loop algebras; **D. Jakelić** and **A. Moura**, On multiplicity problems for finite-dimensional representations of hyper loop algebras; **J. Laliena** and **S. Sacristán**, Maximal subalgebras of simple

alternative superalgebras; **L. Makar-Limanov**, **U. Turusbekova**, and **U. Umirbaev**, Automorphisms of elliptic Poisson algebras; **C. Martínez** and **E. Zelmanov**, Jordan superalgebras and their representations; **K. Meyberg**, A new proof of Itô’s theorem; **F. Montaner** and **M. Tocón**, The ideal of the Lesieur-Croisot elements of a Jordan algebra. II; **J. M. Pérez Izquierdo**, Unital algebras, ternary derivations, and local triality; **P. Plaumann**, **L. Sabinina**, and **L. Sbitneva**, A decomposition of LF -quasigroups; **A. Savage**, Braided and coboundary monoidal categories; **P. Schultz**, Bases for direct powers; **S. R. Sverchkov**, Structure and representations of Jordan algebras arising from intermolecular recombination.

Contemporary Mathematics, Volume 483

May 2009, 285 pages, Softcover, ISBN: 978-0-8218-4652-0, LC 2008044490, 2000 *Mathematics Subject Classification*: 17A70, 17B10, 17B65, 17C10, 17D05, 16G60, 16W30, 18D10, **AMS members US\$63**, List US\$79, Order code CONM/483

Analysis



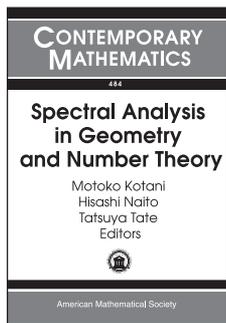
Volume Doubling Measures and Heat Kernel Estimates on Self-Similar Sets

Jun Kigami, *Kyoto University, Japan*

Contents: Prologue; Scales and volume doubling property of measures; Construction of distances; Heat kernel and volume doubling property of measures; Appendix; Bibliography.

Memoirs of the American Mathematical Society, Volume 199, Number 932

May 2009, 94 pages, Softcover, ISBN: 978-0-8218-4292-8, LC 2008055058, 2000 *Mathematics Subject Classification*: 28A80, 60J35; 31C25, 60J45, **Individual member US\$39**, List US\$65, Institutional member US\$52, Order code MEMO/199/932



Spectral Analysis in Geometry and Number Theory

Motoko Kotani, *Tohoku University, Sendai, Japan*, and Hisashi Naito and Tatsuya Tate, *Nagoya University, Japan*, Editors

This volume is an outgrowth of an international conference in honor of

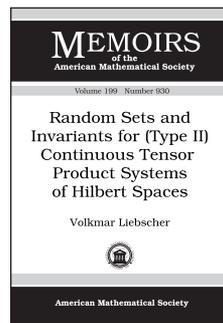
Toshikazu Sunada on the occasion of his sixtieth birthday. The conference took place at Nagoya University, Japan, in 2007.

Sunada's research covers a wide spectrum of spectral analysis, including interactions among geometry, number theory, dynamical systems, probability theory and mathematical physics. Readers will find papers on trace formulae, isospectral problems, zeta functions, quantum ergodicity, random waves, discrete geometric analysis, value distribution, and semiclassical analysis. This volume also contains an article that presents an overview of Sunada's work in mathematics up to the age of sixty.

Contents: *Short biography and work of Professor Sunada:* A. Katsuda and P. W. Sy, Brief profile of Professor Toshikazu Sunada; A. Katsuda and P. W. Sy, An overview of Sunada's work up to age 60; *Articles:* C. Gordon, Sunada's isospectrality technique: Two decades later; S. Ishiwata, A central limit theorem on modified graphs of nilpotent covering graphs; T. Kobayashi, Hidden symmetries and spectrum of the Laplacian on an indefinite Riemannian manifold; N. Kurokawa and H. Ochiai, Spectra of alternating Hilbert operators; J. Masamune, A Liouville property and its application to the Laplacian of an infinite graph; M. Minamide, A note on zero-free regions for the derivative of Selberg zeta functions; M. Morishita and Y. Terashima, Chern-Simons variation and Deligne cohomology; T. Morita, Renormalized Rauzy-Veech-Zorich inductions; H. Naito, Visualization of standard realized Crystal lattices; J. Noguchi, Value distribution and distribution of rational points; M. Pollicott, Limiting distributions for geodesics excursions on the modular surface; M. S. Røisager and Z. Rudnick, On the statistics of the minimal solution of a linear Diophantine equation and uniform distribution of the real part of orbits in hyperbolic spaces; L. Saloff-Coste and W. Woess, Computations of spectral radii on \mathcal{G} -spaces; M. Horsham and R. Sharp, Lengths, quasi-morphisms and statistics for free groups; N. Koldan, I. Prokhorov, and M. Shubin, Semiclassical asymptotics on manifolds with boundary; K.-I. Sugiyama, On geometric analogues of the Birch and Swinnerton-Dyer conjecture for low dimensional hyperbolic manifolds; T. Sunada and H. Urakawa, Ray-Singer zeta functions for compact flat manifolds; T. Tate, Bernstein measures on convex polytopes; S. Zelditch, Real and complex zeros of Riemannian random waves.

Contemporary Mathematics, Volume 484

May 2009, 342 pages, Softcover, ISBN: 978-0-8218-4269-0, LC 2008046241, 2000 *Mathematics Subject Classification:* 58J50, 11M36, 37C30; 35P05, 60J60, **AMS members US\$79**, List US\$99, Order code CONM/484



Random Sets and Invariants for (Type II) Continuous Tensor Product Systems of Hilbert Spaces

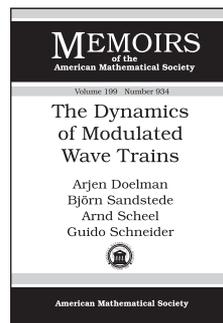
Volkmar Liescher, *GSF-National Research Centre for Environment and Health, Neuherberg, Germany*

Contents: Introduction; Basics; From product systems to random sets; From random sets to product systems; An hierarchy of random sets; Direct integral representations; Measurability in product systems: An algebraic approach; Construction of product systems from general measure types; Beyond separability: Random bisets; An algebraic invariant of product systems; Conclusions and outlook; Bibliography.

Memoirs of the American Mathematical Society, Volume 199, Number 930

May 2009, 101 pages, Softcover, ISBN: 978-0-8218-4318-5, LC 2008055041, 2000 *Mathematics Subject Classification:* 60G55; 81S25, **Individual member US\$40**, List US\$66, Institutional member US\$53, Order code MEMO/199/930

Differential Equations



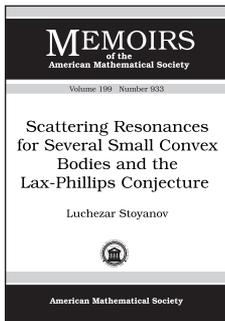
The Dynamics of Modulated Wave Trains

Arjen Doelman, *CWI, Amsterdam, The Netherlands*, Björn Sandstede, *University of Surrey, Guildford, United Kingdom*, Arnd Scheel, *University of Minnesota, Minneapolis, MN*, and Guido Schneider, *Universität Stuttgart, Germany*

Contents: Notation; Introduction; The Burgers equation; The complex cubic Ginzburg-Landau equation; Reaction-diffusion equations: Set-up and results; Validity of the Burgers equation in reaction-diffusion equations; Validity of the inviscid Burgers equation in reaction-diffusion systems; Modulations of wave trains near sideband instabilities; Existence and stability of weak shocks; Existence of shocks in the long-wavelength limit; Applications; Bibliography.

Memoirs of the American Mathematical Society, Volume 199, Number 934

May 2009, 105 pages, Softcover, ISBN: 978-0-8218-4293-5, LC 2008055480, 2000 *Mathematics Subject Classification:* 35K57, 35A35, 35Q53, 37L99, **Individual member US\$40**, List US\$66, Institutional member US\$53, Order code MEMO/199/934



Scattering Resonances for Several Small Convex Bodies and the Lax-Phillips Conjecture

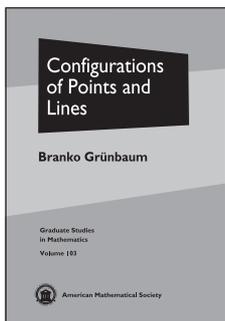
Luchezar Stoyanov, *University of Western Australia, Crawley, Australia*

Contents: Introduction; An abstract meromorphicity theorem; Preliminaries; Ikawa's transfer operator; Resolvent estimates for transfer operators; Uniform local meromorphicity; Proof of the Main Theorem; Curvature estimates; Bibliography.

Memoirs of the American Mathematical Society, Volume 199, Number 933

May 2009, 76 pages, Softcover, ISBN: 978-0-8218-4294-2, LC 2008055068, 2000 *Mathematics Subject Classification*: 58J50, 54C40, 14E20; 37A60, 46E25, 20C20, **Individual member US\$37**, List US\$62, Institutional member US\$50, Order code MEMO/199/933

Discrete Mathematics and Combinatorics



Configurations of Points and Lines

Branko Grünbaum, *University of Washington, Seattle, WA*

This is the only book on the topic of geometric configurations of points and lines. It presents in detail the history of the topic, with its surges and declines since its beginning in 1876. It covers all the advances in the field since the revival of interest in geometric configurations

some 20 years ago. The author's contributions are central to this revival. In particular, he initiated the study of 4-configurations (that is, those that contain four points on each line, and four lines through each point); the results are fully described in the text. The main novelty in the approach to all geometric configurations is the concentration on their symmetries, which make it possible to deal with configurations of rather large sizes. The book brings the readers to the limits of present knowledge in a leisurely way, enabling them to enjoy the material as well as entice them to try their hand at expanding it.

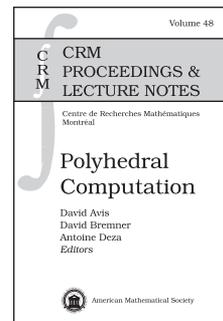
This item will also be of interest to those working in geometry and topology.

Contents: Beginnings; 3-Configurations; 4-Configurations; Other configurations; Properties of configurations; Postscript; Appendix: The Euclidean, projective, and extended Euclidean planes; References.

Graduate Studies in Mathematics, Volume 103

May 2009, approximately 480 pages, Hardcover, ISBN: 978-0-8218-4308-6, LC 2009000303, 2000 *Mathematics Subject Classification*: 01A55, 01A60, 05-03, 05B30, 05C62, 51-03, 51A20, 51A45, 51E30, 52C30, **AMS members US\$60**, List US\$75, Order code GSM/103

Geometry and Topology



Polyhedral Computation

David Avis, *McGill University, Montréal, QC, Canada*, David Bremner, *University of New Brunswick, Fredericton, NB, Canada*, and Antoine Deza, *McMaster University, Hamilton, ON, Canada*, Editors

Many polytopes of practical interest have enormous output complexity and are often highly degenerate, posing severe difficulties for known general-purpose algorithms. They are, however, highly structured, and attention has turned to exploiting this structure, particularly symmetry. Initial applications of this approach have permitted computations previously far out of reach, but much remains to be understood and validated experimentally.

The papers in this volume give a good snapshot of the ideas discussed at a Workshop on *Polyhedral Computation* held at the CRM in Montréal in October 2006 and, with one exception, the current state of affairs in this area. The exception is the inclusion of an often cited 1980 technical report of Norman Zadeh, which was never published in a journal and has passed into the folklore of the discipline. This paper illustrates beautifully the work still to be done in the field: it gives a simple pivot rule for the simplex method for which it is still unknown if it yields a polynomial time algorithm.

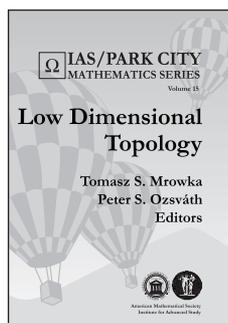
This item will also be of interest to those working in applications.

Titles in this series are co-published with the Centre de Recherches Mathématiques.

Contents: D. Avis and S. Moriyama, On combinatorial properties of linear program digraphs; E. Boros, K. Elbassioni, V. Gurvich, and K. Makino, Generating vertices of polyhedra and related problems of monotone generation; D. Bremner, M. D. Sikirić, and A. Schürmann, Polyhedral representation conversion up to symmetries; S. Columbano, K. Fukuda, and C. N. Jones, An output-sensitive algorithm for multi-parametric LCPs with sufficient matrices; A. Deza and F. Xie, Hyperplane arrangements with large average diameter; T. Theobald, Enumerating the Nash equilibria of rank-1 games; N. Zadeh, What is the worst case behavior of the simplex algorithm?; D. Avis, Postscript to "What is the worst case behavior of the simplex algorithm?"

CRM Proceedings & Lecture Notes, Volume 48

April 2009, 147 pages, Softcover, ISBN: 978-0-8218-4633-9, LC 2008054354, 2000 *Mathematics Subject Classification*: 52B55, 90C05, **AMS members US\$60**, List US\$75, Order code CRMP/48



Low Dimensional Topology

Tomasz S. Mrowka,
Massachusetts Institute of Technology, Cambridge, MA,
and **Peter S. Ozsváth**, *Columbia University, New York, New York,*
Editors

Low-dimensional topology has long been a fertile area for the interaction of

many different disciplines of mathematics, including differential geometry, hyperbolic geometry, combinatorics, representation theory, global analysis, classical mechanics, and theoretical physics. The Park City Mathematics Institute summer school in 2006 explored in depth the most exciting recent aspects of this interaction, aimed at a broad audience of both graduate students and researchers.

The present volume is based on lectures presented at the summer school on low-dimensional topology. These notes give fresh, concise, and high-level introductions to these developments, often with new arguments not found elsewhere. The volume will be of use both to graduate students seeking to enter the field of low-dimensional topology and to senior researchers wishing to keep up with current developments. The volume begins with notes based on a special lecture by John Milnor about the history of the topology of manifolds. It also contains notes from lectures by Cameron Gordon on the basics of three-manifold topology and surgery problems, Mikhail Khovanov on his homological invariants for knots, John Etnyre on contact geometry, Ron Fintushel and Ron Stern on constructions of exotic four-manifolds, David Gabai on the hyperbolic geometry and the ending lamination theorem, Zoltán Szabó on Heegaard Floer homology for knots and three manifolds, and John Morgan on Hamilton's and Perelman's work on Ricci flow and geometrization.

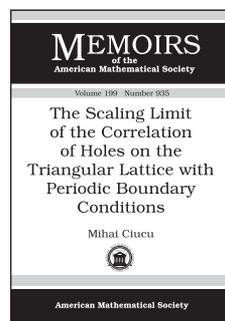
Titles in this series are co-published with the Institute for Advanced Study/Park City Mathematics Institute. Members of the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM) receive a 20% discount from list price.

Contents: P. S. Ozsváth and T. S. Mrowka, Introduction; J. Milnor, Fifty years ago: Topology of manifolds in the 50's and 60's; C. Gordon, Dehn surgery and 3-manifolds; D. Gabai, Hyperbolic geometry and 3-manifold topology; J. W. Morgan, Ricci flow and Thurston's geometrization conjecture (with notes by Max Lipyanskiy); M. Asaeda and M. Khovanov, Notes on link homology; Z. Szabó, Lecture notes on Heegaard Floer homology; J. Etnyre, Contact geometry in low dimensional topology; R. Fintushel and R. J. Stern, Six lectures on four 4-manifolds.

IAS/Park City Mathematics Series, Volume 15

May 2009, approximately 325 pages, Hardcover, ISBN: 978-0-8218-4766-4, 2000 *Mathematics Subject Classification*: 53-XX, 57-XX, 58-XX, **AMS members US\$55**, List US\$69, Order code PCMS/15

Mathematical Physics



The Scaling Limit of the Correlation of Holes on the Triangular Lattice with Periodic Boundary Conditions

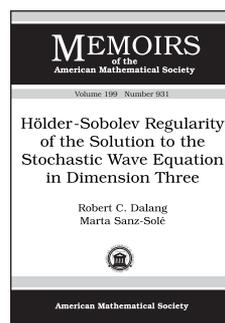
Mihai Ciucu, *Indiana University, Bloomington, IN*

Contents: Introduction; Definition of $\hat{\omega}$ and statement of main result; Deducing Theorem 1.2 from Theorem 2.1 and Proposition 2.2; A determinant formula for $\hat{\omega}$; An exact formula for $U_s(a, b)$; Asymptotic singularity and Newton's divided difference operator; The asymptotics of the entries in the U -part of M' ; The asymptotics of the entries in the P -part of M' ; The evaluation of $\det(M'')$; Divisibility of $\det(M'')$ by the powers of $q - \zeta$ and $q - \zeta^{-1}$; The case $q = 0$ of Theorem 8.1, up to a constant multiple; Divisibility of $\det(dM_0)$ by the powers of $(x_i - x_j) - \zeta^{\pm 1}(y_i - y_j) - ah$ and $(z_i - w_j) - \zeta^{\pm 1}(z_i - w_j) - ah$; Divisibility of $\det(dM_0)$ by the powers of $(x_i - z_j) - \zeta^{\pm 1}(y_i - w_j)$; The proofs of Theorem 2.1 and Proposition 2.2; The case of arbitrary slopes; Random covering surfaces and physical interpretation; Appendix. A determinant evaluation; Bibliography.

Memoirs of the American Mathematical Society, Volume 199, Number 935

May 2009, 100 pages, Softcover, ISBN: 978-0-8218-4326-0, LC 2008055522, 2000 *Mathematics Subject Classification*: 82B23, 82D99; 05A16, 41A63, 60F99, **Individual member US\$40**, List US\$66, Institutional member US\$53, Order code MEMO/199/935

Probability



Hölder-Sobolev Regularity of the Solution to the Stochastic Wave Equation in Dimension Three

Robert C. Dalang, *Ecole Polytechnique Fédérale, Lausanne, Switzerland,* and **Marta Sanz-Solé**, *Universitat de Barcelona, Spain*

Contents: Introduction; The fundamental solution of the wave equation and the covariance function; Hölder-Sobolev regularity of the stochastic integral; Path properties of the solution of the stochastic wave equation; Sharpness of the results; Integrated increments of the covariance function; Bibliography.

Memoirs of the American Mathematical Society, Volume 199, Number 931

May 2009, 80 pages, Softcover, ISBN: 978-0-8218-4288-1, LC 2008055046, 2000 *Mathematics Subject Classification*: 60H15; 60J45, 35R60, 35L05, **Individual member US\$34**, List US\$57, Institutional member US\$46, Order code MEMO/199/931

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Foncteurs en Grassmanniennes, Filtration de Krull et Cohomologie des Foncteurs

Aurélien Djament, *Université Paris 13, Villetaneuse, France*

Let F be the category of functors between vector spaces over a finite field. The *grassmannian functor categories* are obtained by replacing the source of this category by the category of pairs formed by a vector space and an element of one of its grassmannians. These categories have a very rich algebraic structure; the author studies in particular their finite objects and their homological properties.

The author gives a very general vanishing property in functor cohomology, which he applies to the stable K -theory of finite fields: He obtains a generalization of the Betley-Suslin theorem, which expresses certain extension groups of GL_∞ -modules in terms of functor cohomology.

The author's second application of the grassmannian functor categories concerns the Krull filtration of the category F . He gives a conjectural description of this filtration and explores its powerful implications. With the help of tools provided by G. Powell, the author shows a weak form of this conjecture, in the case where the basis field has two elements. Consequently, he establishes the noetherian character of new functors.

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. Préliminaires:* Rappels sur la catégorie \mathcal{F} ; La catégorie \mathcal{F}_{surj} ; Catégories de comodules sur un foncteur en coalgèbres de Boole; Les catégories $\mathcal{F}_{Gr,I}^f$, $\tilde{\mathcal{F}}_{GR}^f$, et $\mathcal{F}_{Pl,n}^f$; *Partie II. Les catégories de foncteurs en grassmanniennes:* Les catégories $\mathcal{F}_{Gr,I}$; La catégorie $\tilde{\mathcal{F}}_{Gr}$; La catégorie $\mathcal{F}_{Gr,I}$ comme catégorie de

modules; Les catégories $\mathcal{F}_{Pl,n}$; Foncteurs hom internes et foncteurs de division dans $\mathcal{F}_{Gr,I}$; *Partie III. Propriétés cohomologiques du foncteur ω .* Applications: Théorème d'annulation cohomologique; Foncteur ω et foncteurs hom internes; La filtration de Krull de la catégorie \mathcal{F} ; Résultats d'annulation cohomologie dans \mathcal{F}_{inj} ; *Partie IV. Foncteur ω et ∇ -nilpotence:* Introduction: la catégorie $\mathcal{F}/\mathcal{F}_\omega$; Préliminaires relatifs aux foncteurs ω et $\tilde{\nabla}_n$; Théorèmes fondamentaux; Adjonctions; Propriétés de finitude dans les catégories abéliennes; Catégories de foncteurs; Index; Index des notations; Bibliographie.

Mémoires de la Société Mathématique de France, Number 111

November 2008, 213 pages, Softcover, ISBN: 978-2-85629-248-8, 2000 *Mathematics Subject Classification*: 16P60, 18A25, 18G15, 20C33, 16E20, 16P40, 18A40, 18C15, 18D15, 18E35, 18G05, 19D99, 55S10, **Individual member US\$50**, List US\$55, Order code SMFMEM/111

Analysis

Notes on Functional Analysis

Rajendra Bhatia, *Indian Statistical Institute, New Delhi, India*

These notes are a record of a one-semester course on Functional Analysis given by the author to second-year Master of Statistics students at the Indian Statistical Institute, New Delhi. Students taking this course have a strong background in real analysis, linear algebra, measure theory and probability, and the course proceeds rapidly from the definition of a normed linear space to the spectral theorem for bounded selfadjoint operators in a Hilbert space.

The book is organized as twenty-six lectures, each corresponding to a ninety-minute class session. This may be helpful to teachers planning a course on this topic. Well-prepared students can read it on their own.

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Contents: Banach spaces; Dimensionality; New Banach Spaces from old; The Hahn-Banach theorem; The uniform boundedness principle; The open mapping theorem; Dual spaces; Some applications; The weak topology; The second dual and the weak* topology; Hilbert spaces; Orthonormal bases; Linear operators; Adjoint operators; Some special operators in Hilbert space; The resolvent and the spectrum; Subdivision of the spectrum; Spectra of normal operators; Square roots and the polar decomposition; Compact operators; The spectrum of a compact operator; Compact operators and invariant subspaces; Trace ideals; The spectral theorem-I; The spectral theorem-II; The spectral theorem-III; Index.

Hindustan Book Agency

January 2009, 248 pages, Hardcover, ISBN: 978-81-85931-89-0, 2000 *Mathematics Subject Classification*: 46-01, **AMS members US\$35**, List US\$44, Order code HIN/38

Functional Analysis

S. Kesavan, *Institute of Mathematical Sciences, Chennai, India*

The material presented in this book is suited for a first course in Functional Analysis which can be followed by master's students. While all the standard material expected of such a course is covered, efforts have been made to illustrate the use of various theorems via examples taken from differential equations and the calculus of variations, either through brief sections or through exercises. In fact, this book will be particularly useful for students who would like to pursue a research career in the applications of mathematics.

The book includes a chapter on weak and weak* topologies and their applications to the notions of reflexivity, separability and uniform convexity. The chapter on the Lebesgue spaces also presents the theory of one of the simplest classes of Sobolev spaces. The book includes a chapter on compact operators and the spectral theory for compact self-adjoint operators on a Hilbert space.

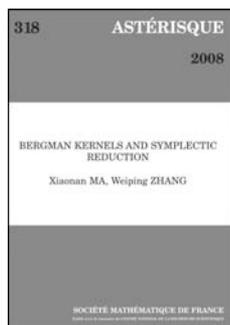
Each chapter has large collection of exercises at the end. These illustrate the results of the text, show the optimality of the hypotheses of various theorems via examples or counterexamples, or develop simple versions of theories not elaborated on in the text.

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Contents: Preliminaries; Normed linear spaces; Hahn-Banach theorems; Baire's theorem and applications; Weak and weak* topologies; L^p spaces; Hilbert spaces; Compact operators; Bibliography; Index.

Hindustan Book Agency

January 2009, 281 pages, Hardcover, ISBN: 978-81-85931-87-6, 2000 *Mathematics Subject Classification:* 46-01, **AMS members US\$35**, List US\$44, Order code HIN/39



Bergman Kernels and Symplectic Reduction

Xiaonan Ma, *École Polytechnique, Palaiseau, France*, and **Weiping Zhang**, *Nankai University, Tianjin, China*

The authors generalize several recent results concerning the asymptotic expansions of Bergman kernels to the framework of geometric quantization and

establish an asymptotic symplectic identification property. More precisely, they study the asymptotic expansion of the G -invariant Bergman kernel of the spin^c Dirac operator associated with high tensor powers of a positive line bundle on a symplectic manifold admitting a Hamiltonian action of a compact connected Lie group G .

The authors also develop a way to compute the coefficients of the expansion, and compute the first few of them; especially, they obtain the scalar curvature of the reduction space from the G -invariant Bergman kernel on the total space. These results generalize the corresponding results in the non-equivariant setting, which have played a crucial role in the recent work of Donaldson on stability of projective manifolds, to the geometric quantization setting.

As another kind of application, the authors establish some Toeplitz operator type properties in semi-classical analysis in the framework of geometric quantization.

The method used is inspired by Local Index Theory, especially by the analytic localization techniques developed by Bismut and Lebeau.

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: Introduction; Connections and Laplacians associated to a principal bundle; G -invariant Bergman kernels; Evaluation of $P^{(r)}$; Applications; Computing the coefficient Φ_1 ; The coefficient $P^{(2)}(0, 0)$; Bergman kernel and geometric quantization; Bibliography; Index.

Astérisque, Number 318

November 2008, 154 pages, Softcover, ISBN: 978-2-85629-255-6, 2000 *Mathematics Subject Classification:* 32A25, 58J37, 53D50, 53D20, 32L10, **Individual member US\$50**, List US\$55, Order code AST/318

Inequalities: An Approach through Problems

B. J. Venkatachala, *Indian Institute of Science, Bangalore, India*

This book is an introduction to the study of fundamental inequalities such as the arithmetic mean-geometric mean inequality, the Cauchy-Schwarz inequality, the Chebyshev inequality, the rearrangement inequality, and the inequalities for convex and concave functions. The emphasis is on the use of these inequalities for solving problems. The book's special feature is a chapter on the geometrical inequalities that studies relations between various geometrical measures. It contains more than 300 problems, many of which are applications of inequalities. A large number of problems are taken from the International Mathematical Olympiads (IMO) and many national olympiads from countries across the world.

The book should be very useful for students participating in mathematical contests. It should also help graduate students consolidate their knowledge of inequalities by way of applications.

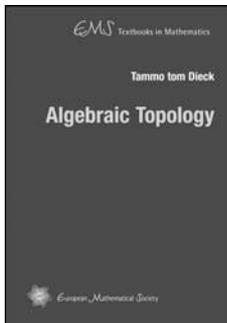
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Contents: Some basic inequalities; Techniques for proving inequalities; Geometric inequalities; Applications involving inequalities; Problems on inequalities; Solutions to problems.

Hindustan Book Agency

January 2009, 400 pages, Hardcover, ISBN: 978-81-85931-88-3, 2000 *Mathematics Subject Classification:* 26D15, 26D20, **AMS members US\$38**, List US\$48, Order code HIN/37

Geometry and Topology



Algebraic Topology

Tammo tom Dieck, *University of Göttingen, Germany*

This book is written as a textbook on algebraic topology. The first part covers the material for two introductory courses about homotopy and homology. The second part presents more advanced applications and concepts (duality, characteristic classes, homotopy groups of spheres, bordism). The author

recommends starting an introductory course with homotopy theory. For this purpose, classical results are presented with new elementary proofs. Alternatively, one could start more traditionally with singular and axiomatic homology. Additional chapters are devoted to the geometry of manifolds, cell complexes and fibre bundles. A special feature is the rich supply of nearly 500 exercises and problems. Several sections include topics which have not appeared before in textbooks as well as simplified proofs for some important results.

Prerequisites are standard point set topology (as recalled in the first chapter), elementary algebraic notions (modules, tensor product), and some terminology from category theory. The aim of the book is to introduce advanced undergraduate and graduate (master's) students to basic tools, concepts and results of algebraic topology. Sufficient background material from geometry and algebra is included.

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

Contents: Topological spaces; The fundamental group; Covering spaces; Elementary homotopy theory; Cofibrations and fibrations; Homotopy groups; Stable homotopy. Duality; Cell complexes; Singular homology; Homology; Homological algebra; Cellular homology; Partitions of unity in homotopy theory; Bundles; Manifolds; Homology of manifolds; Cohomology; Duality; Characteristic classes; Homology and homotopy; Bordism; Bibliography; Symbols; Index.

EMS Textbooks in Mathematics, Volume 8

September 2008, 578 pages, Hardcover, ISBN: 978-3-03719-048-7, 2000 *Mathematics Subject Classification*: 55-01, 57-01, AMS members US\$62, List US\$78, Order code EMSTEXT/8

Flag Varieties: An Interplay of Geometry, Combinatorics, and Representation Theory

V. Lakshmibai and Justin Brown, *Northeastern University, Boston, MA*

Flag varieties are important geometric objects and their study involves an interplay of geometry, combinatorics, and representation theory. This book is a detailed account of this interplay. In the area of representation theory, the book discusses complex semisimple Lie algebras and semisimple algebraic groups; in addition, the representation theory of symmetric groups is

discussed. In the area of algebraic geometry, the book explains in detail Grassmannian varieties, flag varieties, and their Schubert subvarieties.

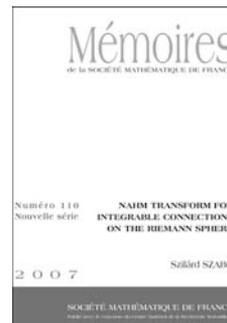
Because of the connections with root systems, many of the geometric results admit elegant combinatorial description, a typical example being the description of the singular locus of a Schubert variety. This is shown to be a consequence of standard monomial theory (abbreviated SMT). Thus the book includes SMT and some important applications—singular loci of Schubert varieties, toric degenerations of Schubert varieties, and the relationship between Schubert varieties and classical invariant theory.

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Contents: Introduction; Preliminaries; Structure theory of semisimple rings; Representation theory of finite groups; Representation theory of the symmetric group; Symmetric polynomials; Schur–Weyl duality and the relationship between representations of Sd and $GL_n(C)$; Structure theory of complex semisimple Lie algebras; Representation theory of complex semisimple Lie algebras; Generalities on algebraic groups; Structure theory of reductive groups; Representation theory of semisimple algebraic groups; Geometry of the grassmannian, flag and their Schubert varieties via standard monomial theory; Singular locus of a Schubert variety in the flag variety SL_n/B ; Applications; Appendix: Chevalley groups; Bibliography; List of symbols; Index.

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January 2009, 288 pages, Hardcover, ISBN: 978-81-85931-92-0, 2000 *Mathematics Subject Classification*: 14M15, AMS members US\$38, List US\$48, Order code HIN/40



Nahm Transform for Integrable Connections on the Riemann Sphere

Szilárd Szabó, *University Louis Pasteur, Strasbourg, France*

The author defines Nahm transform for parabolic integrable connections with regular singularities and one Poincaré rank

1 irregular singularity on the Riemann sphere. After a first definition using L^2 -cohomology, he gives an algebraic description in terms of hypercohomology. Exploiting these different interpretations, he gives the transformed object by explicit analytic formulas as well as geometrically, by its spectral curve. Finally, he shows that this transform is (up to a sign) an involution.

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: Introduction; Notations and statement of the results; Analysis of the Dirac operator; The transform of the integrable connection; Interpretation from the point of view of Higgs bundles; The inverse transform; Index; Bibliography.

Mémoires de la Société Mathématique de France, Number 110

November 2008, 114 pages, Softcover, ISBN: 978-2-85629-251-8, 2000 *Mathematics Subject Classification*: 53C07, 14H60, **Individual member US\$36**, List US\$40, Order code SMFMEM/110

Surveys in Differential Geometry. Volume X

Essays in Geometry in Memory of S.-S. Chern

Shing-Tung Yau, *Harvard University, Cambridge, MA*, Editor

This volume includes lectures on geometry and topology related to the works of the late and venerated S.-S. Chern. The lectures were presented at the 2005 Journal of Differential Geometry conference at Harvard University.

This larger format re-issue includes a correction to the table of contents, a revised preface, and an updated series listing at the front of the book.

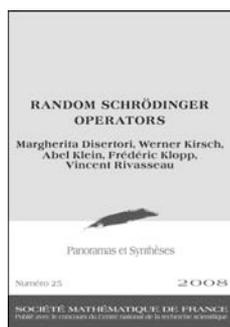
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Contents: **B. Dai**, **C.-L. Terng**, and **K. Uhlenbeck**, On the space-time monopole equation; **V. Guillemin**, **S. Sternberg**, and **J. Weitsman**, The Erhardt function for symbols; **K. Liu**, Recent results on the moduli spaces of Riemann surfaces; **W. Meeks**, Applications of minimal surfaces to the topology of three-manifolds; **V. Moncrief**, An integral equation for spacetime curvature in general relativity; **A. Nietzke** and **C. Vafa**, Topological strings and their physical applications; **R. P. Thomas**, Notes on GIT and symplectic reduction for bundles and varieties; **S.-T. Yau**, Perspectives on geometric analysis; **S.-W. Zhang**, Distributions in algebraic dynamics.

International Press

December 2008, 430 pages, Hardcover, ISBN: 978-1-57146-122-3, 2000 *Mathematics Subject Classification*: 03-02, **AMS members US\$76**, List US\$95, Order code INPR/69.R

Mathematical Physics



Random Schrödinger Operators

Margherita Disertori, *ETH-Zurich, Switzerland*, **Werner Kirsch**, *Universität Hagen, Germany*, **Abel Klein**, *University of California, Irvine, CA*, **Frédéric Klopp**, *Université Paris-Nord, Villetaneuse, France*, and **Vincent Rivasseau**, *Université Paris XI, Orsay, France*

During the last thirty years, random Schrödinger operators, which originated in condensed matter physics, have been studied intensively and very productively. The theory is at the crossroads of a number of mathematical fields: the theory of operators, partial differential equations, the theory of probabilities, in particular

the study of stochastic processes and that of random walks and Brownian motion in a random environment. This monograph aims to give the reader a panorama of the subject, from the now-classic foundations to very recent developments.

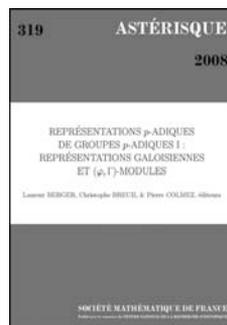
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Contents: **W. Kirsch**, An invitation to random Schrödinger operators (with an appendix by F. Klopp); **A. Klein**, Multiscale analysis and localization of random operators; **M. Disertori** and **V. Rivasseau**, Random matrices and the Anderson model.

Panoramas et Synthèses, Number 25

November 2008, 213 pages, Softcover, ISBN: 978-2-85629-254-9, 2000 *Mathematics Subject Classification*: 82B44, 35J10, 47B80, 60H25, 81Q10, **Individual member US\$65**, List US\$72, Order code PASY/25

Number Theory



Représentations p -adiques de Groupes p -adiques I: Représentations Galoisiennes et (φ, Γ) -Modules

Laurent Berger, *Université de Lyon, France*, **Christophe Breuil**, *CNRS & IHES, Bures-sur-Yvette, France*, and **Pierre Colmez**, *École Polytechnique, Jussieu, France*, Editors

France, and **Pierre Colmez**, *École Polytechnique, Jussieu, France*, Editors

This volume is the first in a series of three dedicated to the p -adic Langlands correspondence for $GL_2(\mathbb{Q}_p)$. The correspondence itself is the subject of the second volume (local aspects) and the third volume (global and geometric aspects). This book begins with a general introduction by Breuil to the three volumes.

The articles in this first volume have three broad themes: the study of classical p -adic representations and (φ, Γ) -modules, the study of families of p -adic representations, and the study of relative p -adic representations.

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Contents: **C. Breuil**, Introduction générale; **L. Berger**, Equations différentielles p -adiques et (φ, N) -modules filtrés; **F. Andreatta** and **O. Brinon**, Surconvergence des représentations p -adiques: le cas relatif; **P. Colmez**, Espaces vectoriels de dimension finie et représentations de de Rham; **P. Colmez**, Conducteur d'Artin d'une représentation de de Rham; **P. Colmez**, Représentations triangulaires de dimension 2; **K. Kedlaya**, Slope filtrations for relative Frobenius; **L. Berger** and **P. Colmez**, Familles de représentations de de Rham et monodromie p -adique; **F. Andreatta** and **A. Iovita**, Global applications of relative (φ, Γ) -modules I;

Appendix A. Galois cohomology via the Tate-Sen method; Appendix B. Artin-Schreier theory; References.

Astérisque, Number 319

January 2009, 419 pages, Softcover, ISBN: 978-2-85629-256-3, 2000 *Mathematics Subject Classification*: 11F80, 11G99, 11Sxx, 11S15, 11S20, 11S80, 12H25, 13K05, 14E22, 14F30, 14F20, **Individual member US\$119**, List US\$132, Order code AST/319

Arithmetical Aspects of the Large Sieve Inequality

Olivier Ramaré, *Université Lille 1, France*, and D. S. Ramana, *Harish-Chandra Research Institute, Allahabad, India*

This book is an elaboration of a series of lectures given at the Harish-Chandra Research Institute. The reader will be taken through a journey on the arithmetical sides of the large sieve inequality which, when applied to the Farey dissection, will reveal connections between this inequality, the Selberg sieve and other less used notions such as pseudo-characters and the Λ_Q -function, as well as extend these theories.

One of the leading themes of these notes is the notion of so-called *local models* that throws a unifying light on the subject. As examples and applications, the authors present, among other things, an extension of the Brun-Titchmarsh Theorem, a new proof of Linnik's Theorem on quadratic residues, and an equally novel one of the Vinogradov's Three Primes Theorem; the authors also consider the problem of small prime gaps, of sums of two squarefree numbers and several other ones, some of them new, like a sharp upper bound for the number of twin primes p that are such that $p + 1$ is squarefree. In the end the problem of equality in the large sieve inequality is considered, and several results in this area are also proved.

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Contents: Introduction; The large sieve inequality; An extension of the classical arithmetical theory of the large sieve; Some general remarks on arithmetical functions; A geometric interpretation; Further arithmetical applications; The Siegel zero effect; A weighted hermitian inequality; A first use of local models; Twin primes and local models; The three primes theorem; The Selberg sieve; Fourier expansion of sieve weights; The Selberg sieve for sequences; An overview; Some weighted sequences; Small gaps between primes; Approximating by a local model; Selecting other sets of moduli; Sums of two squarefree numbers; On a large sieve equality; Appendix; Notations; References; Index.

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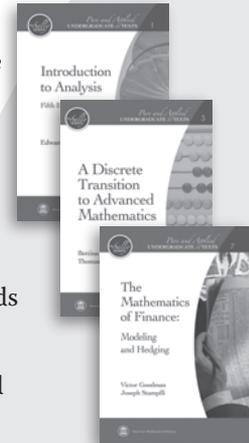
January 2009, 210 pages, Softcover, ISBN: 978-81-85931-90-6, 2000 *Mathematics Subject Classification*: 11Nxx, 11M20, 11P32, **AMS members US\$30**, List US\$38, Order code HIN/36

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