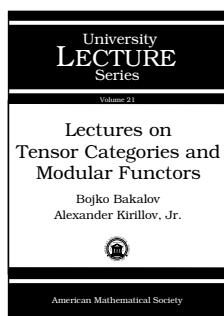


New Publications Offered by the AMS

Algebra and Algebraic Geometry

Supplementary Reading



Lectures on Tensor Categories and Modular Functors

Bojko Bakalov, *University of California, Berkeley*, and Alexander Kirillov, Jr., *SUNY at Stony Brook, NY*

This book gives a comprehensive exposition of the relations among the following three topics: monoidal

tensor categories (such as a category of representations of a quantum group), 3-dimensional topological quantum field theory, and 2-dimensional modular functors (which naturally arise in 2-dimensional conformal field theory). The following examples are discussed in detail: the category of representations of a quantum group at a root of unity and the Wess-Zumino-Witten modular functor.

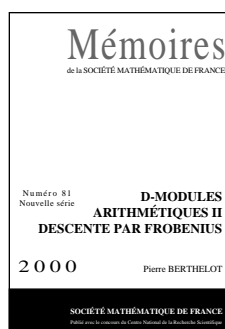
The idea that these topics are related first appeared in the physics literature in the study of quantum field theory. Pioneering works of Witten and Moore-Seiberg triggered an avalanche of papers, both physical and mathematical, exploring various aspects of these relations. Upon preparing to lecture on the topic at MIT, however, the authors discovered that the existing literature was difficult and that there were gaps to fill.

The text is wholly expository and finely succinct. It gathers results, fills existing gaps, and simplifies some proofs. The book makes an important addition to the existing literature on the topic. It would be suitable as a course text at the advanced-graduate level.

Contents: Braided tensor categories; Ribbon categories; Modular tensor categories; 3-dimensional topological quantum field theory; Modular functors; Moduli spaces and complex modular functors; Wess-Zumino-Witten model; Bibliography; Index; Index of notation.

University Lecture Series, Volume 21

November 2000, approximately 222 pages, Softcover, ISBN 0-8218-2686-7, 2000 *Mathematics Subject Classification*: 18D10, 81T40, 57R56, 81T45; 57M27, 81R10, 17B67, 17B37, All AMS members \$23, List \$29, Order code ULECT/21N



D-Modules Arithmétiques II Descente Par Frobenius

Pierre Berthelot, *IRMAR, Université de Rennes I, France*

A publication of the *Société Mathématique de France*.

In algebraic geometry, regardless of the characteristic, the theory of modules over suitable rings of differential operators, generically called “*D*-modules”, is an essential tool in the study of de Rham cohomology and other theories derived from it (crystalline and rigid cohomologies). In this memoir, the author studies the particular properties of the action of a lifting of the Frobenius morphism on the category of *D*-modules when the base is a scheme annihilated by a power of a fixed prime *p* or a *p*-adic formal scheme. The main result is a descent theorem for the Frobenius morphism, allowing to reduce the study of modules endowed with an action of usual differential operators of order $\leq p^m$ to that of modules endowed with an action of derivations. The author proves the compatibility of this descent with all cohomological operations from *D*-module theory, which shows that any *D*-module of geometric origin can be endowed, in a suitable sense, with a natural Frobenius action. Some applications are included. Text is in French.

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

Contents: Introduction; *D*-modules à droite; Théorèmes de descente; Théorèmes de commutation à l’action de Frobenius; $F - D^+$ -modules; Appendice: Filtration *m*-PD-adique; Bibliographie.

Mémoires de la Société Mathématique de France, Number 81
June 2000, 136 pages, Softcover, ISBN 2-85629-086-8, 2000 *Mathematics Subject Classification*: 14F10, 14F30, 14F40, 16S32, 32C38, Individual member \$30, List \$33, Order code SMFMEM/81N

A Special Volume of the Michigan Mathematical Journal in Honor of William Fulton

Gopal Prasad, *University of Michigan, Ann Arbor*, **Spencer Bloch**, *University of Chicago, IL*, **Igor Dolgachev**, *University of Michigan, Ann Arbor*, **Ronald Fintushel**, *Michigan State University, East Lansing*, **John Erik Fornæss** and **John Lott**, *University of Michigan, Ann Arbor*, **G. A. Margulis**, *Yale University, New Haven, CT*, **Andrew M. Odlyzko**, *AT&T, Florham Park, NJ*, **Joel Smoller**, *University of Michigan, Ann Arbor*, and **S.-T. Yau**, *Harvard University, Cambridge, MA*, Editors

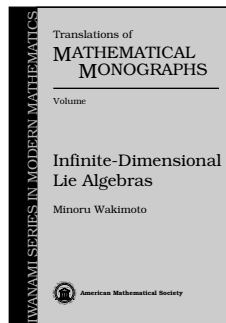
A publication of the University of Michigan, Department of Mathematics.

This volume constitutes a special issue of the *Michigan Mathematical Journal* dedicated to William Fulton on the occasion of his sixtieth birthday. Attesting to the breadth of his contributions, the volume contains some thirty papers on a wide range of topics centered in algebraic geometry, representation theory, and commutative algebra. This collection will be of interest to researchers and students in these and neighboring fields.

Distributed worldwide by the AMS.

Contents: **P. Aluffi** and **C. Faber**, Linear orbits of arbitrary plane curves; **A. Beauville**, Determinantal hypersurfaces; **A. Bertram**, Some applications of localization to enumerative problems; **M. Brion**, Poincaré duality and equivariant (co)homology; **H. Clemens** and **H. Kley**, On an example of Voisin; **P. Deligne**, **M. Goresky**, and **R. MacPherson**, L'algèbre de cohomologie du complément dans un espace affine, d'une famille finie de sous-espaces affines; **J.-P. Demailly**, **L. Ein**, and **R. Lazarsfeld**, A subadditivity property of multiplier ideals; **P. Diaconis** and **A. Ram**, Analysis of systematic scan metropolis algorithms using Iwahori-Hecke algebra techniques; **I. V. Dolgachev**, Polar cremona transformations; **D. Edidin** and **W. Graham**, Good representations and solvable groups; **C. Faber** and **R. Pandharipande**, Logarithmic series and Hodge integrals in the tautological ring; **S. Fomin** and **M. Shapiro**, Stratified spaces formed by totally positive varieties; **D. Franco**, **S. L. Kleiman**, and **A. T. Lascu**, Gherardelli linkage and complete intersections; **T. Garrity**, Global structures on CR manifolds via Nash blow-ups; **A. Givental**, On the WDVV-equation in quantum K-theory; **M. Hochster** and **C. Huneke**, Localization and test exponents for tight closure; **Y. Hu** and **S. Keel**, Mori dream spaces and GIT; **T. Józefiak**, A construction of irreducible $GL(m)$ -representatives; **J. Kollár**, Fundamental groups of rationally connected varieties; **A. Kresch**, Gromov-Witten invariants of a class of toric varieties; **D. Laksov** and **A. Thorup**, The algebra of jets; **A. Lascoux** and **P. Pragacz**, Orthogonal divided differences and Schubert polynomials, \hat{P} -functions, and vertex operators; **A. Losev** and **Y. Manin**, New modular spaces of pointed curves and pencils of flat connections; **M. V. Nori**, The Hirzebruch-Riemann-Roch theorem; **D. Perkinson**, Inflections of toric varieties; **P. C. Roberts**, Intersection multiplicities and Hilbert polynomials; **B. Shapiro**, **M. Shapiro**, **A. Vainshtein**, and **A. Zelevinsky**, Simply-laced Coxeter groups and groups generated by symplectic transvections; **K. Smith**, Globally F-regular varieties: Applications to vanishing theorems for quotients of Fano varieties; **F. Sottile**, Some real and unreal enumerative geometry for flag manifolds; **H. Tamvakis**, Height formulas for homogeneous varieties; **B. Totaro**, The topology of smooth divisors and the arithmetic of abelian varieties.

September 2000, 600 pages, Hardcover, 2000 *Mathematics Subject Classification*: 14-XX, All AMS members \$50, List \$62.50, Order code MMJSPN



Infinite-Dimensional Lie Algebras

Minoru Wakimoto, *Kyushu University, Fukuoka, Japan*

This volume begins with an introduction to the structure of finite-dimensional simple Lie algebras, including the representation of $\mathfrak{sl}(2, \mathbb{C})$, root systems, the Cartan matrix, and a Dynkin diagram of a finite-dimensional simple Lie algebra. Continuing on, the main subjects of the

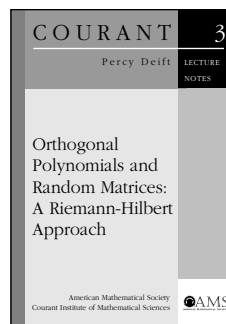
book are the structure (real and imaginary root systems) of and the character formula for Kac-Moody superalgebras, which is explained in a very general setting. Only elementary linear algebra and group theory are assumed. Also covered is modular property and asymptotic behavior of integrable characters of affine Lie algebras. The exposition is self-contained and includes examples. The book can be used in a graduate-level course on the topic.

Contents: Opening; Structures and representations of BKM (super-)algebras; Affine Lie algebras; Modular transformations of characters of affine Lie algebras; Fusion algebras; In lieu of postscript-Virasoro algebra; Further developments; Bibliography; Index.

Translations of Mathematical Monographs (*Iwanami Series in Modern Mathematics*)

December 2000, approximately 320 pages, Softcover, ISBN 0-8218-2654-9, 2000 *Mathematics Subject Classification*: 17B62, 17B65, 17B67, 17B69, 81R10, 81T05, 81T40, All AMS members \$39, List \$49, Order code MMONO-WAKIMOTON

Analysis



Orthogonal Polynomials and Random Matrices: A Riemann-Hilbert Approach

Percy Deift, *New York University-Courant Institute, NY*

This volume expands on a set of lectures held at the Courant Institute on Riemann-Hilbert problems, orthogonal polynomials, and random matrix theory. The goal of the course was to prove universality for a variety of statistical quantities arising in the theory of random matrix models. The central question was the following: Why do very general ensembles of random $n \times n$ matrices exhibit universal behavior as $n \rightarrow \infty$? The main ingredient in the proof is the steepest descent method for oscillatory Riemann-Hilbert problems.

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

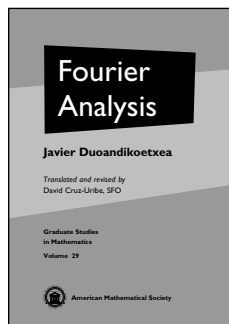
Titles in this series are copublished with the Courant Institute of Mathematical Sciences at New York University.

Contents: Riemann-Hilbert problems; Jacobi operators; Orthogonal polynomials; Continued fractions; Random matrix theory; Equilibrium measures; Asymptotics for orthogonal polynomials; Universality; Bibliography.

Courant Lecture Notes, Volume 3

October 2000, 261 pages, Softcover, ISBN 0-8218-2695-6, 2000 *Mathematics Subject Classification:* 30-XX, 33-XX, 60-XX, 15A90, 26Cxx, **All AMS members \$25**, List \$31, Order code CLN/3N

Recommended Text



Fourier Analysis

Javier Duoandikoetxea,
Universidad del País Vasco/Euskal Herriko Unibertsitatea, Bilbao, Spain

Fourier analysis encompasses a variety of perspectives and techniques. This volume presents the real variable methods of Fourier analysis introduced by Calderón and Zygmund. The text was born from a graduate course

taught at the Universidad Autónoma de Madrid and incorporates lecture notes from a course taught by José Luis Rubio de Francia at the same university.

Motivated by the study of Fourier series and integrals, classical topics are introduced, such as the Hardy-Littlewood maximal function and the Hilbert transform. The remaining portions of the text are devoted to the study of singular integral operators and multipliers. Both classical aspects of the theory and more recent developments, such as weighted inequalities, H^1 , BMO spaces, and the $T1$ theorem, are discussed.

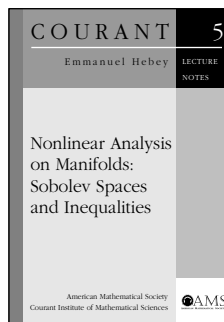
Chapter 1 presents a review of Fourier series and integrals; Chapters 2 and 3 introduce two operators that are basic to the field: the Hardy-Littlewood maximal function and the Hilbert transform in higher dimensions. Chapters 4 and 5 discuss singular integrals, including modern generalizations. Chapter 6 studies the relationship between H^1 , BMO , and singular integrals; Chapter 7 presents the elementary theory of weighted norm inequalities. Chapter 8 discusses Littlewood-Paley theory, which had developments that resulted in a number of applications. The final chapter concludes with an important result, the $T1$ theorem, which has been of crucial importance in the field.

This volume has been updated and translated from the original Spanish edition (1995). Minor changes have been made to the core of the book; however, the sections, "Notes and Further Results" have been considerably expanded and incorporate new topics, results, and references. It is geared toward graduate students seeking a concise introduction to the main aspects of the classical theory of singular operators and multipliers. Prerequisites include basic knowledge in Lebesgue integrals and functional analysis.

Contents: Fourier series and integrals; The Hardy-Littlewood maximal function; The Hilbert transform; Singular integrals (I); Singular integrals (II); H^1 and BMO ; Weighted inequalities; Littlewood-Paley theory and multipliers; The $T1$ theorem; Bibliography.

Graduate Studies in Mathematics, Volume 29

December 2000, approximately 232 pages, Hardcover, ISBN 0-8218-2172-5, LC 00-064301, 2000 *Mathematics Subject Classification:* 42B15, 42B20, 42B25, **All AMS members \$28**, List \$35, Order code GSM/29N



Nonlinear Analysis on Manifolds: Sobolev Spaces and Inequalities

Emmanuel Hebey, *University of Cergy-Pontoise, France*

This volume offers an expanded version of lectures given at the Courant Institute on the theory of Sobolev spaces on Riemannian manifolds.

"Several surprising phenomena appear when studying Sobolev spaces on manifolds," according to the author. "Questions that are elementary for Euclidean space become challenging and give rise to sophisticated mathematics, where the geometry of the manifold plays a central role."

The volume is organized into nine chapters. Chapter 1 offers a brief introduction to differential and Riemannian geometry. Chapter 2 deals with the general theory of Sobolev spaces for compact manifolds. Chapter 3 presents the general theory of Sobolev spaces for complete, noncompact manifolds. Best constants problems for compact manifolds are discussed in Chapters 4 and 5. Chapter 6 presents special types of Sobolev inequalities under constraints. Best constants problems for complete noncompact manifolds are discussed in Chapter 7. Chapter 8 deals with Euclidean-type Sobolev inequalities. And Chapter 9 discusses the influence of symmetries on Sobolev embeddings. An appendix offers brief notes on the case of manifolds with boundaries.

This topic is a field undergoing great development at this time. However, several important questions remain open. So a substantial part of the book is devoted to the concept of best constants, which appeared to be crucial for solving limiting cases of some classes of PDEs.

The volume is highly self-contained. No familiarity is assumed with differentiable manifolds and Riemannian geometry, making the book accessible to a broad audience of readers, including graduate students and researchers.

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

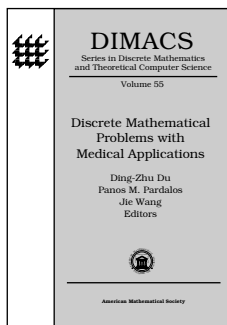
Titles in this series are copublished with the Courant Institute of Mathematical Sciences at New York University.

Contents: Elements of Riemannian geometry; Sobolev spaces: The compact setting; Sobolev spaces: The noncompact setting; Best constants in the compact setting I; Best constants in the compact setting II; Optimal inequalities with constraints; Best constants in the noncompact setting; Euclidean-type Sobolev inequalities; The influence of symmetries; Manifolds with boundary; Bibliography.

Courant Lecture Notes, Volume 5

October 2000, 292 pages, Softcover, ISBN 0-8218-2700-6, 2000 *Mathematics Subject Classification:* 58E35; 53C21, **All AMS members \$27**, List \$34, Order code CLN/5N

Applications



Discrete Mathematical Problems with Medical Applications

Ding-Zhu Du, *University of Minnesota, Minneapolis*,
Panos M. Pardalos, *University of Florida, Gainesville*, and
Jie Wang, *University of North Carolina, Greensboro*, Editors

This volume presents selected papers from a three-day workshop held during the DIMACS special years on Mathematical Support for Molecular Biology. Participants from the world over attended, giving the workshop an important international component.

The study of discrete mathematics and optimization with medical applications is emerging as an important new research area. Significant applications have been found in medical research, for example in radiosurgical treatment planning, virtual endoscopy, and more. This volume presents a substantive cross-section of active research topics ranging from medical imaging to human anatomy modeling, from gamma knife treatment planning to radiation therapy, and from epileptic seizures to DNA screening. This book is an up-to-date resource reflecting current research directions.

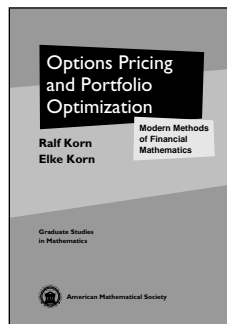
This item will also be of interest to those working in discrete mathematics and combinatorics.

Contents: **Y.-J. Lee**, **O. L. Mangasarian**, and **W. H. Wolberg**, Breast cancer survival and chemotherapy: A support vector machine analysis; **P. Hall**, A model for learning human vascular anatomy; **M. C. Ferris** and **D. M. Shepard**, Optimization of gamma knife radiosurgery; **Q. J. Wu**, Sphere packing using morphological analysis; **L. D. Iasemidis**, **D.-S. Shiau**, **J. C. Sackellares**, and **P. Pardalos**, Transition to epileptic seizures: Optimization; **I. Nyström** and **Ö. Smedby**, Analysis of magnetic resonance angiography images using skeletonization and distance transforms; **S. Bouix** and **K. Siddiqi**, Computing medial surfaces; **A. Rangarajan** and **H. Chui**, A mixed variable optimization approach to non-rigid image registration; **B. DasGupta**, **X. He**, **T. Jiang**, **M. Li**, **J. Tromp**, and **L. Zhang**, On computing the nearest neighbor interchange distance; **A. J. Macula**, **D. C. Torney**, and **P. A. Vilenkin**, Two-stage group testing for complexes in the presence of errors; **L. Sheng**, **C. Wang**, and **P. Zhang**, On the perfectness of tagged probe interval graphs; **S. E. Brossette** and **A. P. Sprague**, Frequent sets in the presence of clones: An example from medical surveillance; **H. Q. Ngo** and **D.-Z. Du**, A survey on combinatorial group testing algorithms with applications to DNA library screening; **Q. J. Wu**, **C. J. Wang**, and **H. Sibata**, Optimization problems in 3D conformal radiation therapy; **A. Kuba**, **G. T. Herman**, **S. Matej**, and **A. Todd-Pokropek**, Medical applications of discrete tomography; **J. K. Udupa**, A study of 3D imaging approaches in medicine; **P. Hall**, Discrete mathematics in medical imaging: A personal view.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, Volume 55

November 2000, approximately 248 pages, Hardcover, ISBN 0-8218-2096-6, 2000 *Mathematics Subject Classification*: 68T10, 62N01, 68T05, 68T45, 92C50, 68Q17, 68W40, 62K99, 68R10, 52C99, 05B20, 68W99, 68R05, 92C55, 06B99; 90C90, 15A18, 62H99, 90C30, 90C11, 57N99, 68Q25, 05D05, 62P10,
Individual member \$41, List \$69, Institutional member \$55,
 Order code DIMACS/55N

Recommended Text



Options Pricing and Portfolio Optimization

Modern Methods of Financial Mathematics

Ralf Korn and **Elke Korn**,
University of Kaiserslautern, Germany

Understanding and working with the current models of financial markets

requires a sound knowledge of the mathematical tools and ideas from which they are built. Banks and financial houses all over the world recognize this and are avidly recruiting mathematicians, physicists, and other scientists with these skills.

The mathematics involved in modern finance springs from the heart of probability and analysis: the Itô calculus, stochastic control, differential equations, martingales, and so on. The authors give rigorous treatments of these topics, while always keeping the applications in mind. Thus, the way in which the mathematics is developed is governed by the way it will be used, rather than by the goal of optimal generality. Indeed, most of purely mathematical topics are treated in extended "excursions" from the applications into the theory. Thus, with the main topic of financial modelling and optimization in view, the reader also obtains a self-contained and complete introduction to the underlying mathematics.

This book is specifically designed as a graduate textbook. It could be used for the second part of a course in probability theory, as it includes an applied introduction to the basics of stochastic processes (martingales and Brownian motion) and stochastic calculus. It would also be suitable for a course in continuous-time finance that assumes familiarity with stochastic processes.

The prerequisites are basic probability theory and calculus. Some background in stochastic processes would be useful, but not essential.

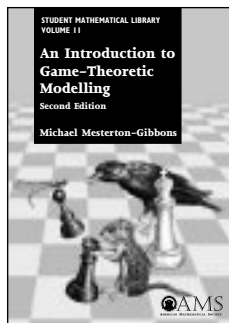
This item will also be of interest to those working in probability.

Contents: The mean-variance approach in a one-period model; The continuous-time market model; Option pricing; Pricing of exotic options and numerical algorithms; Optimal portfolios; Bibliography; Index.

Graduate Studies in Mathematics

November 2000, approximately 272 pages, Hardcover, ISBN 0-8218-2123-7, 2000 *Mathematics Subject Classification*: 62P05, 91B28, 93E20; 49L20, 60G44, 60H05, **All AMS members \$31**, List \$39, Order code GSM-KORNN

Recommended Text



An Introduction to Game-Theoretic Modelling

Second Edition

Michael Mesterton-Gibbons,
Florida State University,
Tallahassee

From reviews for the First Edition:

Readers will be hard-pressed to find a general introduction to game theory that blends biological and mathematical approaches more expertly. It is both a well-rounded survey and a reference work of lasting value.

—Behavioral Ecology

This book is an introduction to game theory with two specific features: it is written by a mathematician ... and it is written from the perspective of a mathematical modeller. This last characteristic implies that all chapters start with examples and the general concepts are only presented once the specific examples have been carefully developed ... I find this book excellent and ... worth considering when teaching an undergraduate course in game theory to students having some mathematical maturity (some calculus, some knowledge of matrix analysis and probability).

—Zentralblatt für Mathematik

This book is about using game theory in mathematical modeling. It is an introductory text, covering the basic ideas and methods of game theory as well as the necessary ideas from the vast spectrum of scientific study where the methods are applied.

It has by now become generally apparent that game theory is a fascinating branch of mathematics with both serious and recreational applications. Strategic behavior arises whenever the outcome of an individual's action depends on actions to be taken by other individuals—whether human, as in the Prisoners' Dilemma, or otherwise, as in the “duels of damselflies”. As a result, game-theoretic mathematical models are applicable in both the social and natural sciences. In reading this book, you can learn not just about game theory, but also about how to model real situations so that they can be analyzed mathematically.

Mesterton-Gibbons includes the familiar game theory examples where they are needed for explaining the mathematics or when they provide a valuable application. There are also plenty of new examples, in particular from biology, such as competitions for territory or mates, games among kin versus games between kin, and cooperative wildlife management.

Prerequisites are modest. Students should have some mathematical maturity and a familiarity with basic calculus, matrix algebra, probability, and some differential equations. As Mesterton-Gibbons writes, “The recurring theme is that game theory is fun to learn, doesn't require a large amount of mathematical rigor, and has great potential for application.”

This new edition contains a significant amount of updates and new material, particularly on biological games. An important chapter on population games now has virtually all new material. The book is absolutely up-to-date with numerous references to the literature. Each chapter ends with a commentary which surveys current developments.

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

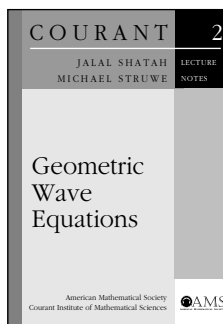
Contents: Noncooperative games; Evolutionary stability and other selection criteria; Cooperative games in strategic form; Characteristic function games; Cooperation and the prisoner's dilemma; More population games; Appraisal; The tracing procedure; Solutions to selected exercises; Bibliography; Index.

Student Mathematical Library, Volume 11

October 2000, 368 pages, Softcover, ISBN 0-8218-1929-1, LC 00-059399, 2000 *Mathematics Subject Classification:* 91-01, 91A10, 91A12, 91A22, 91A40, 91A80; 92-02, 92D50, **All AMS members \$31**, List \$39, Order code STML/11N

Differential Equations

Supplementary Reading



Geometric Wave Equations

Jalal Shatah, *New York University-Courant Institute of Mathematical Sciences, NY*, and
Michael Struwe, *Eidgenössische Technische Hochschule-Zentrum, Zurich, Switzerland*

This volume contains notes of the lectures given at the Courant Institute and a DMV-Seminar at Oberwolfach. The focus is on the recent work of the authors on semilinear wave equations with critical Sobolev exponents and on wave maps in two space dimensions. Background material and references have been added to make the notes self-contained. The book is suitable for use in a graduate-level course on the topic.

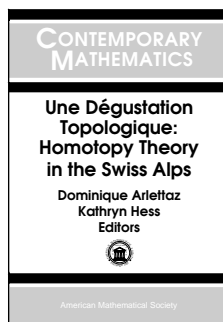
Titles in this series are copublished with the Courant Institute of Mathematical Sciences at New York University.

Contents: The wave equation; Conservation laws; Function spaces; The linear wave equation; Well-posedness; Semilinear wave equations; Wave maps; Wave maps with symmetry; Notes; Bibliography.

Courant Lecture Notes, Volume 2

November 2000, 138 pages, Softcover, ISBN 0-8218-2749-9, 2000 *Mathematics Subject Classification:* 35-01, **All AMS members \$19**, List \$24, Order code CLN/2N

Geometry and Topology



Une Dégustation Topologique: Homotopy Theory in the Swiss Alps

Dominique Arlettaz, *Université de Lausanne, Switzerland*, and **Kathryn Hess**, *Ecole Polytechnique Fédérale de Lausanne, Switzerland*, Editors

The talks given at the Arolla Conference on Algebraic Topology covered a broad spectrum of current research in homotopy theory, offering participants the possibility to sample and relish selected morsels of homotopy theory, much as a participant in a wine tasting partakes of a variety of fine wines. True to the spirit of the conference, the proceedings included in this volume present a savory sampler of homotopical delicacies. Readers will find within these pages a compilation of articles describing current research in the area, including classical stable and unstable homotopy theory, configuration spaces, group cohomology, K-theory, localization, p -compact groups, and simplicial theory.

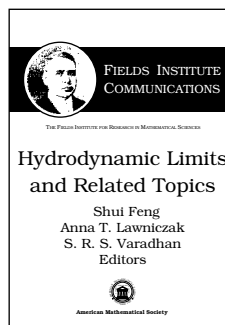
Contents: **C. Casacuberta** and **J. Scherer**, Homological localizations preserve 1-connectivity; **F. R. Cohen** and **F. P. Peterson**, Some free modules over the cohomology of $K(Z/2Z, n)$: A short walk in the Alps; **J. Cornick** and **I. J. Leary**, Some remarks concerning degree zero complete cohomology; **E. D. Farjoun**, Two completion towers for generalized homology; **P. G. Goerss** and **M. J. Hopkins**, André-Quillen (co-)homology for simplicial algebras over simplicial operads; **M. Jakob**, An alternative approach to homology; **J.-L. Loday**, Homotopical Syzygies; **S. A. Mitchell**, K-theory hypercohomology spectra of number rings at the prime 2; **J. Neisendorfer**, A survey of Anick-Gray-Theriault constructions and applications to the exponent theory of spheres and Moore spaces; **A. Osse** and **U. Suter**, Invariant theory and the K-theory of the Dwyer-Wilkerson space; **P. A. Østvær**, Algebraic K-theory spectra of non-exceptional two-regular number fields; **D. C. Ravenel**, The microstable Adams-Novikov spectral sequence; **J. L. Rodríguez** and **D. Scevenels**, Iterating series of localization functors; **A. Viruel**, E_8 is a totally N -determined 5-compact group; **M. A. Xicoténcatl**, On orbit configuration spaces and the rational cohomology of $F(\mathbb{R}P^n, K)$.

Contemporary Mathematics

December 2000, approximately 280 pages, Softcover, ISBN 0-8218-2078-8, LC 00-061797, 2000 *Mathematics Subject Classification*: 55-06; 00B25, 13-06, 18-06, 19-06, 20-06, 57-06, **Individual member \$41**, List \$69, Institutional member \$55, Order code CONM-HESSN

Mathematical Physics

Recommended Text



Hydrodynamic Limits and Related Topics

Shui Feng, *McMaster University, Hamilton, ON, Canada*, **Anna T. Lawnczak**, *University of Guelph, ON, Canada*, and **S. R. S. Varadhan**, *New York University-Courant Institute of Mathematical*

Sciences, NY, Editors

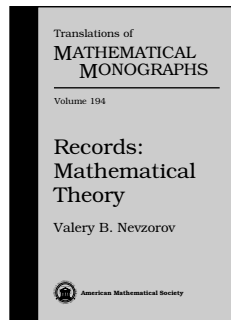
This book presents the lecture notes and articles from the workshop on hydrodynamic limits held at The Fields Institute (Toronto). The first part of the book contains the notes from the mini-course given by Professor S. R. S. Varadhan. The second part contains research articles reviewing the diverse progress in the study of hydrodynamic limits and related areas. This book offers a comprehensive introduction to the theory and its techniques, including entropy and relative entropy methods, large deviation estimates, and techniques in nongradient systems. This book, especially the lectures of Part I, could be used as a text for an advanced graduate course in hydrodynamic limits and interacting particle systems.

Contents: *Part 1:* **S. R. S. Varadhan**, Lectures on hydrodynamic scaling; *Part 2:* **J. A. Carrillo**, On a 1-d granular media immersed in a fluid; **H. Fukś**, A class of cellular automata equivalent to deterministic particle systems; **T. Funaki**, Recent results on the Ginzburg-Landau $\nabla\phi$ interface model; **I. Grigorescu**, Large scale behavior of a system of interacting diffusions; **R. Illner**, Stellar dynamics and plasma physics with corrected potentials: Vlasov, Manev, Boltzmann, Smoluchowski; **J. Quastel**, Free boundary problem and hydrodynamic limit; **T. Seppäläinen**, A variational coupling for a totally asymmetric exclusion process with long jumps but no passing; **H.-T. Yau**, Quantum mechanics, linear Boltzmann equation and renormalization.

Fields Institute Communications, Volume 27

November 2000, approximately 152 pages, Hardcover, ISBN 0-8218-1993-3, LC 00-063944, 2000 *Mathematics Subject Classification*: 60K35, 82C22; 35B40, 35Q99, 37B15, 68Q80, 76X05, 82C05, 82C20, 82C21, 82C24, **Individual member \$29**, List \$49, Institutional member \$39, Order code FIC/27N

Probability



Recommended Text

Records: Mathematical Theory

Valery B. Nevzorov, *Saint Petersburg State University, Russia*

This volume is based on a course of lectures delivered at the St. Petersburg State University (Russia) and at Ohio State University (Columbus). It is intended as a textbook for graduate students and postdocs.

The book presents the theory of records and some information on order statistics. Also included are exercises illustrating the examples and developing the ideas.

The past 20 years has seen tremendous progress in the topic, giving forth a large number of new models that reflect the dynamics of records in a wide range of areas. This volume presents systematic main results with a special emphasis on non-classical record schemes. The material is presented in a comprehensive style succinctly outlining the current state of the theory. The work is geared toward statisticians, actuaries, engineers, hydrologists, meteorologists, and sports and market analysts.

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

Contents: Introduction; Order statistics; Record times and record values; Theory of records: Historical review; Hints, solutions, and answers; Bibliography.

Translations of Mathematical Monographs, Volume 194

October 2000, 164 pages, Hardcover, ISBN 0-8218-1945-3, LC 00-061821, 2000 *Mathematics Subject Classification*: 62-01, 62-02; 62E10, 62G20, 62G30, **Individual member \$39**, List \$65, Institutional member \$52, Order code MMONO/194N

Previously Announced Publications

Recommended Text

An Introduction to Superprocesses

Alison M. Etheridge, *University of Oxford, England*

Over the past 20 years, the study of superprocesses has expanded into a major industry and can now be regarded as a central theme in modern probability theory. This book is intended as a rapid introduction to the subject, geared toward graduate students and researchers in stochastic analysis.

A variety of different approaches to the superprocesses emerged over the last ten years. Yet no one approach superseded any others. In this book, readers are exposed to a number of different ways of thinking about the processes, and each is used to motivate some key results. The emphasis is on why results are true rather than on rigorous proof. Specific

results are given, including extensive references to current literature for their general form.

University Lecture Series, Volume 20

August 2000, 187 pages, Softcover, ISBN 0-8218-2706-5, LC 00-044160, 2000 *Mathematics Subject Classification*: 60-02; 60G57, 60J80, 60K35, 60H30, 60J70, 60G17, 60H15, **All AMS members \$26**, List \$33, Order code ULECT/20RT010

Modules over Non-Noetherian Domains

László Fuchs, *Tulane University, New Orleans, LA*, and **Luigi Salce**, *University of Padova, Italy*

In this book, the authors present both traditional and modern discoveries in the subject area, concentrating on advanced aspects of the topic.

Existing material is studied in detail, including finitely generated modules, projective and injective modules, and the theory of torsion and torsion-free modules. Some topics are treated from a new point of view. Also included are areas not found in current texts, for example, pure-injectivity, divisible modules, uniserial modules, etc.

Special emphasis is given to results that are valid over arbitrary domains. The authors concentrate on modules over valuation and Prüfer domains, but also discuss Krull and Matlis domains, h -local, reflexive, and coherent domains. The volume can serve as a standard reference book for specialists working in the area and also is a suitable text for advanced-graduate algebra courses and seminars.

Mathematical Surveys and Monographs, Volume 84

November 2000, 613 pages, Hardcover, ISBN 0-8218-1963-1, LC 00-044205, 2000 *Mathematics Subject Classification*: 13Cxx, 13Fxx, 13G05, 13Jxx, 13Hxx, **Individual member \$65**, List \$109, Institutional member \$87, Order code SURV/84RT010

Kolmogorov in Perspective

The editorial board for the History of Mathematics series has selected for this volume a series of translations from two Russian publications, *Kolmogorov in Remembrance* and *Mathematics and its Historical Development*. This book, *Kolmogorov in Perspective*, includes articles written by Kolmogorov's students and colleagues and his personal accounts of shared experiences and lifelong mathematical friendships. Specifically, the article, "Andreï Nikolaevich Kolmogorov. A Biographical Sketch of His Life and Creative Paths" by A. N. Shiryaev, gives an excellent personal and scientific biography of Kolmogorov. The volume also includes the following articles: "On A. N. Kolmogorov" by V. I. Arnol'd, "In Memory of A. N. Kolmogorov" by S. M. Nikol'skii, "Remembrances of A. N. Kolmogorov" by Ya. G. Sinai, "The Influence of Andreï Nikolaevich Kolmogorov on My Life" by P. L. Ul'yanov, "A Few Words on A. N. Kolmogorov" by P. S. Aleksandrov, "Memories of P. S. Aleksandrov" by A. N. Kolmogorov, "Newton and Contemporary Mathematical Thought" by A. N. Kolmogorov, and an extensive bibliography with the complete list of Kolmogorov's works—including the articles written for encyclopedias and newspapers. The book is illustrated with photographs and includes quotations from Kolmogorov's letters and conversations, uniquely reflecting his mathematical tastes and opinions.

Previously Announced Publications

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

Contributors include: A. N. Shiryaev, V. I. Arnol'd, S. M. Nikol'skiĭ, Ya. G. Sinaĭ, P. L. Ul'yanov, P. S. Aleksandrov, and A. N. Kolmogorov.

History of Mathematics, Volume 20

October 2000, 230 pages, Hardcover, ISBN 0-8218-0872-9, LC 00-044162, 2000 *Mathematics Subject Classification*: 01A70, **All AMS members \$39**, List \$49, Order code HMATH/20RT010

Recommended Text

Notes on Seiberg-Witten Theory

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

In this volume the author presents, in great detail and with many examples, a basic collection of principles, techniques, and applications needed to conduct independent research in gauge theory and its use in geometry and topology. Complete and self-contained computations of the Seiberg-Witten invariants of most simply connected algebraic surfaces using only Witten's factorization method are included. Also given is a new approach to cutting and pasting Seiberg-Witten invariants, which is illustrated by examples such as the connected sum theorem, the blow-up formula, and a proof of a vanishing result of Fintushel and Stern. The book is a suitable textbook for advanced graduate courses in differential geometry, algebraic topology, basic PDEs and functional analysis.

Graduate Studies in Mathematics, Volume 28

November 2000, approximately 484 pages, Hardcover, ISBN 0-8218-2145-8, LC 00-044761, 2000 *Mathematics Subject Classification*: 57R57, 57R19, 57R15, 58D27, 14J80, 53C55, 58J05, 58J52, **All AMS members \$47**, List \$59, Order code GSM/28RT010

DNA Based Computers V

Erik Winfree, *California Institute of Technology, Pasadena*, and David K. Gifford, *Massachusetts Institute of Technology, Cambridge*, Editors

This proceedings volume presents the talks from the Fifth Annual Meeting on DNA Based Computers held at MIT. The conference brought together researchers and theorists from many disciplines who shared research results in biomolecular computation.

Two styles of DNA computing were explored at the conference: 1) DNA computing based on combinatorial search, where randomly created DNA strands are used to encode potential solutions to a problem, and constraints induced by the problem are used to identify DNA strands that are solution witnesses; and 2) DNA computing based on finite-state machines, where the state of a computation is encoded in DNA, which controls the biochemical steps that advance the DNA-based machine from state to state.

Featured articles include discussions on the formula satisfiability problem, self-assembly and nanomachines, simulation and design of molecular systems, and new theoretical approaches.

Contributors include: D. Faulhammer, A. R. Cukras, R. J. Lipton, L. F. Landweber, H. Yoshida, A. Suyama, D. H. Wood, J. Chen, E. Antipov, B. Lemieux, W. Cedeño, B. Bloom, C. Bancroft, K. Chen, E. Winfree, A. P. Mills, Jr.,

B. Yurke, P. M. Platzman, A. Marathe, A. E. Condon, R. M. Corn, M. Garzon, R. J. Deaton, J. A. Rose, M. Yamamoto, J. Yamashita, T. Shiba, T. Hirayama, S. Takiya, K. Suzuki, M. Munekata, A. Ohuchi, A. J. Hartemink, T. S. Mikkelsen, D. K. Gifford, T. H. LaBean, J. H. Reif, M. G. Lagoudakis, T. Yokomori, A. J. Turberfield, M. P. Robertson, J. Hesselberth, J. C. Cox, A. D. Ellington, A. Ehrenfeucht, H. J. Hoogeboom, G. Rozenberg, N. van Vugt, L. Kari, G. Păun, and A. Gehani.

DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, Volume 54

October 2000, 249 pages, Hardcover, ISBN 0-8218-2053-2, LC 00-040621, 2000 *Mathematics Subject Classification*: 68-06, 68Q05, 68Q10, 68M99, 92-06, 92B05, 92B20, 92C05, **Individual member \$41**, List \$69, Institutional member \$55, Order code DIMACS/54RT010

Combined Membership List 2000–2001

The *Combined Membership List* (CML) is a comprehensive directory of the membership of the American Mathematical Society, the American Mathematical Association of Two-Year Colleges, the Association for Women in Mathematics, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics.

There are two lists of individual members. The first is a complete alphabetical list of all members in all five organizations. For each member, the CML provides his or her address, title, department, institution, telephone number (if available), and electronic address (if indicated), and also indicates membership in the five participating societies. The second is a list of individual members according to their geographic locations. In addition, the CML lists academic, institutional, and corporate members of the five participating societies providing addresses and telephone numbers of mathematical sciences departments.

The CML is distributed on request to AMS members in even-numbered years. MAA members can request the CML in odd-numbered years from the MAA. The CML is an invaluable reference for keeping in touch with colleagues and for making connections in the mathematical sciences community in the United States and abroad.

December 2000, approximately 387 pages, Softcover, ISBN 0-8218-2637-9, 2000 *Mathematics Subject Classification*: 00-XX, **Individual member \$39**, List \$65, Institutional member \$52, Order code CML/2000/2001RT010