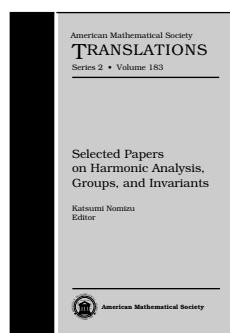


New Publications Offered by the AMS

General and Interdisciplinary



Selected Papers on Harmonic Analysis, Groups, and Invariants

Katsumi Nomizu, *Brown University, Providence, RI*, Editor

This volume contains papers that originally appeared in Japanese in the journal *Sūgaku*. Ordinarily the papers

would appear in the AMS translation of that journal, but to expedite publication the Society has chosen to publish them as a volume of selected papers. The papers range over a variety of topics, including representation theory, differential geometry, invariant theory, and complex analysis.

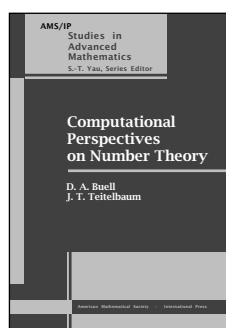
This text will also be of interest to those working in algebra and algebraic geometry and geometry and topology.

Contents: **T. Kobayashi**, Harmonic analysis on homogeneous manifolds of reductive type and unitary representation theory; **M. A. Guest** and **Y. Ohnita**, Actions of loop groups, deformations of harmonic maps, and their applications; **T. Umeda**, The Capelli identities, a century after; **K. Koike**, On representation of the classical groups; **K. Saito**, Around the theory of the generalized weight system: Relations with singularity theory, the generalized Weyl group and its invariant theory, etc.

American Mathematical Society Translations—Series 2, Volume 183

December 1997, 143 pages, Hardcover, ISBN 0-8218-0840-0, LC 97-27740, 1991 *Mathematics Subject Classification*: 00B50; 22-02, 58-02, 15-02, 20-02, 32-02, **Individual member \$35**, List \$59, Institutional member \$47, Order code TRANS2/183N

Number Theory



Computational Perspectives on Number Theory Proceedings of a Conference in Honor of A. O. L. Atkin

D. A. Buell, *Center for Computing Sciences, Bowie, MD*, and **J. T. Teitelbaum**,

University of Illinois at Chicago, Editors

This volume contains papers presented at the conference “Computational Perspectives on Number Theory” held at the University of Illinois at Chicago in honor of the retirement of A. O. L. Atkin. In keeping with Atkin’s interests and work, the papers cover a range of topics, including algebraic number theory, p -adic modular forms and modular curves. Many of the papers reflect Atkin’s particular interest in computational and algorithmic questions.

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

Contents: **A. O. L. Atkin**, Intelligent primality test offer; **B. Birch**, Atkin and the Atlas Lab; **N. D. Elkies**, Elliptic and modular curves over finite fields and related computational issues; **R. Lercier** and **F. Morain**, Algorithms for computing isogenies between elliptic curves; **M. Kaneko** and **D. Zagier**, Supersingular j -invariants, hypergeometric series, and Atkin’s orthogonal polynomial; **F. Q. Gouvêa** and **B. Mazur**, On the density of modular representations; **R. Coleman**, **G. Stevens**, and **J. Teitelbaum**, Numerical experiments on families of p -adic modular forms; **A. K. Pizer**, Ramanujan graphs; **W.-C. W. Li**, Elliptic curves, Kloosterman sums, and Ramanujan graphs; **K. Belabas** and **H. Cohen**, Binary cubic forms and cubic number fields; **R. L. Bender** and **C. Pomerance**, Rigorous discrete logarithm computations in finite fields via smooth polynomials.

AMS/IP Studies in Advanced Mathematics, Volume 7

December 1997, 232 pages, Softcover, ISBN 0-8218-0880-X, LC 97-45482, 1991 *Mathematics Subject Classification*: 11Yxx; 11Gxx, 11-06, **All AMS members \$47**, List \$59, Order code AMSIP/7N

Analysis



Wavelets, Multiwavelets, and Their Applications

Akram Aldroubi, *Vanderbilt University, Nashville, TN*, and EnBing Lin, *University of Toledo, OH*, Editors

This volume contains refereed research articles on the active area of wavelets and multiwavelets. The book

draws upon work presented by experts in the field during the special session on "Wavelets, Multiwavelets and Their Applications" at the Joint Mathematics Meetings in San Diego (January 1997).

Wavelets were implicit in mathematics, physics, signal or image processing, and numerical analysis long before they were given the status of a unified scientific field in the late 1980s. They continue to be one of the few subjects that have attracted considerable interest from the mathematical community as well as from other diverse disciplines where they have had promising applications. The topic is in full evolution, with many active research efforts emerging from the fruitful interaction of various mathematical subjects and other scientific disciplines.

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

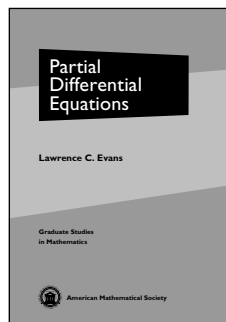
Contents: *Part I: Wavelet theory and applications:* R. Balan, Extensions of no-go theorems to many signal systems; X. Dai, D. R. Larson, and D. M. Speegle, Wavelet sets in \mathbb{R}^n . II; J.-P. Gabardo and M. Z. Nashed, An analogue of Cohen's condition for nonuniform multiresolution analyses; G. G. Walter and Xiaoping Shen, Positive estimation with wavelets; R. A. Zalik, A class of quasi-orthogonal wavelet bases; *Part II: Multiwavelet theory and applications:* A. Aldroubi and M. Papadakis, Characterization and parameterization of multiwavelet bases; T. B. Dinsbacher and D. P. Hardin, Nonhomogeneous refinement equations; E. Lin and Z. Xiao, Multi-scaling function interpolation and approximation; V. Strela, A note on construction of biorthogonal multi-scaling functions; X.-G. Xia, Orthonormal matrix valued wavelets and matrix Karhunen-Loève expansion.

Contemporary Mathematics

February 1998, 175 pages, Softcover, ISBN 0-8218-0793-5, LC 97-38981, 1991 *Mathematics Subject Classification:* 42A15, 41A25, 42A38, 42A10, 42C15, 41A58, 42A99, 42C99; 43A99, 39B62, 65D99, 46E40, 94A11, 94A12, 46C50, 45B05, 46N30, **Individual member \$29**, List \$49, Institutional member \$39, Order code CONM-LIN2N

Differential Equations

Recommended Text



Partial Differential Equations

Lawrence C. Evans, *University of California, Berkeley*

This text gives a comprehensive survey of modern techniques in the theoretical study of partial differential equations (PDEs) with particular emphasis on nonlinear equations. The exposition is divided into three parts: 1) representation formulas for solutions, 2) theory for linear partial

differential equations, and 3) theory for nonlinear partial differential equations.

Included are complete treatments of the method of characteristics; energy methods within Sobolev spaces; regularity for second-order elliptic, parabolic and hyperbolic equations; maximum principles; the multidimensional calculus of variations; viscosity solutions of Hamilton-Jacobi equations; shock waves and entropy criteria for conservation laws; and much more.

The author summarizes the relevant mathematics required to understand current research in PDEs, especially nonlinear PDEs. While he has reworked and simplified much of the classical theory (particularly the method of characteristics), he primarily emphasizes the modern interplay between functional analytic insights and calculus-type estimates within the context of Sobolev spaces. Treatment of all topics is complete and self-contained. The book's wide scope and clear exposition make it a suitable text for a graduate course in PDEs.

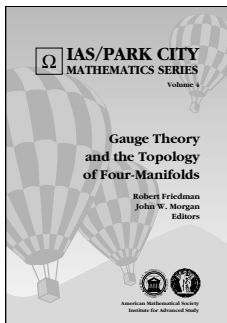
Contents: Introduction; *Part I. Representation Formulas for Solutions:* Four important linear PDE; Nonlinear first-order PDE; Other ways to represent solutions; *Part II. Theory for Linear Partial Differential Equations:* Sobolev spaces; Second-order elliptic equations; Linear evolution equations; *Part III. Theory for Nonlinear Partial Differential Equations:* The calculus of variations; Nonvariational techniques; Hamilton-Jacobi equations; Systems of conservation laws; Appendices; Bibliography; Index.

Graduate Studies in Mathematics

April 1998, approximately 712 pages, Hardcover, ISBN 0-8218-0772-2, LC 97-41033, 1991 *Mathematics Subject Classification:* 35-XX; 49-XX, 47Hxx, **All AMS members \$60**, List \$75, Order code GSM-EVANSN

Geometry and Topology

Supplementary Reading



Gauge Theory and the Topology of Four-Manifolds

Robert Friedman and John W. Morgan, *Columbia University, New York, NY*, Editors

The lectures in this volume provide a perspective on how 4-manifold theory was studied before the discovery of

modern-day Seiberg-Witten theory. One reason the progress using the Seiberg-Witten invariants was so spectacular was that those studying $SU(2)$ -gauge theory had more than ten years' experience with the subject. The tools had been honed, the correct questions formulated, and the basic strategies well understood. The knowledge immediately bore fruit in the technically simpler environment of the Seiberg-Witten theory.

Gauge theory long predates Donaldson's applications of the subject to 4-manifold topology, where the central concern was the geometry of the moduli space. One reason for the interest in this study is the connection between the gauge theory moduli spaces of a Kähler manifold and the algebro-geometric moduli space of stable holomorphic bundles over the manifold. The extra geometric richness of the $SU(2)$ -moduli spaces may one day be important for purposes beyond the algebraic invariants that have been studied to date. It is for this reason that the results presented in this volume will be essential.

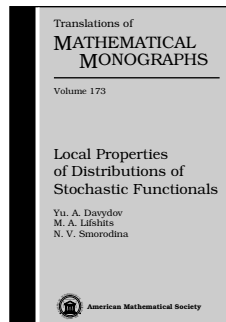
Members of the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM) receive a 20% discount from list price.

Contents: D. Gieseker, *Geometric Invariant Theory and the Moduli of Bundles*: Geometric invariant theory; The numerical criterion; The moduli of stable bundles, References; J. Li, *Anti-Self-Dual Connections and Stable Vector Bundles*: Introduction; Hermitian bundles, Hermitian connections, and their curvatures; Hermitian-Einstein connections and stable vector bundles; The existence of Hermitian-Einstein metrics; References; J. W. Morgan, *An Introduction to Gauge Theory*: The context of gauge theory; Principal bundles and connections; Curvature and characteristic classes; The space of connections; The ASD equations and the moduli space; Compactness and gluing theorems; The Donaldson polynomial invariants; The connected sum theorem; References; R. J. Stern, *Computing Donaldson Invariants*: Overview; -2 spheres and the blowup formula; Simple-type criteria and elliptic surfaces; Elementary rational blowdowns; Taut configurations and Horikawa surfaces; References; C. H. Taubes and J. A. Bryan, *Donaldson-Floer Theory*: Introduction; Quantization; Simplicial decomposition of \mathcal{M}_X^0 ; Half-infinite dimensional spaces; References.

IAS/Park City Mathematics Series, Volume 4

January 1998, 221 pages, Hardcover, ISBN 0-8218-0591-6, LC 97-32356, 1991 *Mathematics Subject Classification*: 14-XX, 32-XX, 53-XX, 57-XX, 58-XX, All AMS members \$31, List \$39, Order code PCMS/4N

Probability



Local Properties of Distributions of Stochastic Functionals

Yu. A. Davydov, *University of Lille I, Villeneuve d'Ascq, France*, M. A. Lifshits, *MANCOMTECH Training Center, St. Petersburg, Russia*, and N. V. Smorodina, *Radiation Hygiene Institute, St. Petersburg, Russia*

Radiation Hygiene Institute, St. Petersburg, Russia

This book investigates the distributions of functionals defined on the sample paths of stochastic processes. It contains systematic exposition and applications of three general research methods developed by the authors.

(i) The method of stratifications is used to study the problem of absolute continuity of distribution for different classes of functionals under very mild smoothness assumptions. It can be used also for evaluation of the distribution density of the functional.

(ii) The method of differential operators is based on the abstract formalism of differential calculus and proves to be a powerful tool for the investigation of the smoothness properties of the distributions.

(iii) The superstructure method, which is a later modification of the method of stratifications, is used to derive strong limit theorems (in the variation metric) for the distributions of stochastic functionals under weak convergence of the processes.

Various application examples concern the functionals of Gaussian, Poisson and diffusion processes as well as partial sum processes from the Donsker-Prokhorov scheme.

The research methods and basic results in this book are presented here in monograph form for the first time. The text would be suitable for a graduate course in the theory of stochastic processes and related topics.

Contents: Preliminaries; Methods for studying distributions of functionals; Gaussian functionals; Poisson functionals; Local limit theorems; Bibliographical notes; Bibliography; Index.

Translations of Mathematical Monographs, Volume 173

January 1998, 184 pages, Hardcover, ISBN 0-8218-0584-3, LC 97-44426, 1991 *Mathematics Subject Classification*: 60-02, 60F17, 60F99, 60G15, 60G30, 60G50, 60H99, **Individual member \$45**, List \$75, Institutional member \$60, Order code MMONO/173N