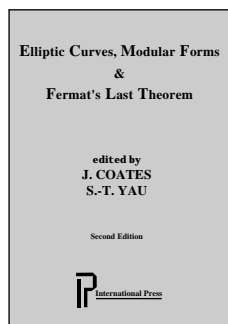


# New Publications Offered by the AMS

## Algebra and Algebraic Geometry



### Elliptic Curves, Modular Forms & Fermat's Last Theorem

John Coates, *University of Cambridge, England*, and S.-T. Yau, *Harvard University, Cambridge, MA*, Editors

This is an expanded edition of a previously published work. Two chapters have been added to this revised edition.

A conference, on the general theme of "Elliptic Curves and Modular Forms" was held in the Mathematics Department of the Chinese University of Hong Kong in December 1993. The impetus for organizing the conference arose from Andrew Wiles' deep and spectacular work on the celebrated conjecture that every elliptic curve over  $\mathbb{Q}$  is modular, although only some of the lectures at the conference were specifically related to this theme. At the time of the conference, the difficulties in the last hurdle in Wiles' work (the proof of the conjectural upper bound for the order of the Selmer group attached to the symmetric square of a modular form) had still not been overcome. It is now history that Wiles himself, assisted by R. Taylor, found a beautiful proof of the desired upper bound. As a result, we now know today the remarkable fact that every semi-elliptic curve over  $\mathbb{Q}$  is modular. This proof is not only revolutionary in its own right, but it also provides a proof of Fermat's Last Theorem. This volume is a mixture of the texts of some of these lectures, together with a number of recent articles related to the general theme of the conference.

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

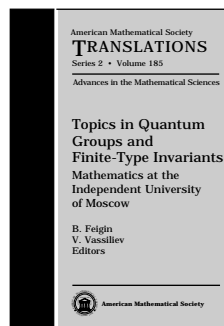
*International Press* publications are distributed worldwide, except in Japan, by the American Mathematical Society.

**Contents:** H. Darmon, F. Diamond, and R. Taylor, Fermat's Last Theorem; P. Balister, Characteristic distributions for non-torsion  $\Lambda$ -modules; J. Coates and A. Sydenham, On the symmetric square of a modular elliptic curve; F. Diamond, The refined conjecture of Serre; N. Elkies, Wiles minus epsilon

implies Fermat; J.-M. Fontaine and B. Mazur, Geometric Galois representations; G. Frey, On elliptic curves; H. W. Lenstra, Jr., Complete intersections and Gorenstein rings; L. Merel, Homologie des courbes modulaires; K. A. Ribet, Irreducible Galois representation; K. Rubin and A. Silverberg, Mod  $p$  representations of elliptic curves; J. Tate, A review of non-Archimedean elliptic functions; R. Taylor, On Galois representations associated to Hilbert modular forms II.

**International Press**

1997, 340 pages, Hardcover, ISBN 1-57146-049-7, 1991 *Mathematics Subject Classification:* 00B25; 11, 06, 14, All AMS members \$34, List \$42, Order code INPR/5N



### Topics in Quantum Groups and Finite-Type Invariants

Mathematics at the Independent University of Moscow

B. Feigin and V. Vassiliev, *Independent University of Moscow, Russia*, Editors

This volume presents the first collection of articles consisting entirely of work by faculty and students of the Higher Mathematics College of the Independent University of Moscow (IUM). This unique institution was established to train elite students to become research scientists. Covered in the book are two main topics: quantum groups and low-dimensional topology. The articles were written by participants of the Feigin and Vassiliev seminars, two of the most active seminars at the IUM.

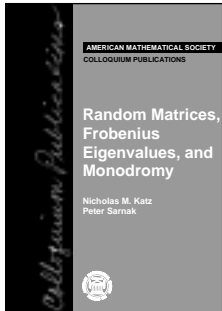
This text will also be of interest to those working in geometry and topology.

**Contents:** *Algebra:* S. M. Arkhipov, Semi-infinite cohomology of quantum groups. II; David Erschler, Symmetry groups of regular polyhedra over finite fields; B. L. Feigin and A. V. Odesskii, Coordinate ring of the quantum Grassmannian and intertwiners for the representations of Sklyanin algebras; B. L. Feigin and A. V. Odesskii, Vector bundles on an elliptic curve and Sklyanin algebras; M. Finkelberg, A. Kuznetsov, and I. Mirković, The singular supports of IC sheaves on spaces of quasimaps are irreducible; Boris Shoikhet, Cohomology of the Lie algebras of differential operators: Lifting formulas; *Geom-*

etry: **P. M. Akhmetiev**, On a higher analog of the linking number of two curves; **S. S. Anisov** and **S. K. Lando**, Topological complexity of  $T^2$ -bundles over the circle; **S. K. Lando**, Tutte decomposition for graphs, weighted graphs, and symmetric matrices; **V. Turchin**, Homology isomorphism of the complex of 2-connected graphs and the graph-complex of trees; **V. A. Vassiliev**, On invariants and homology of spaces of knots in arbitrary manifolds.

**American Mathematical Society Translations—Series 2**  
(*Advances in the Mathematical Sciences*), Volume 185

June 1998, 182 pages, Hardcover, ISBN 0-8218-1084-7, LC 91-640741, 1991 *Mathematics Subject Classification*: 17Bxx, 57Mxx; 16Wxx, **Individual member \$53**, List \$89, Institutional member \$71, Order code TRANS2/185N



## Random Matrices, Frobenius Eigenvalues, and Monodromy

**Nicholas M. Katz** and  
**Peter Sarnak**, Princeton University, NJ

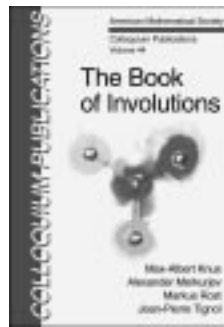
The main topic of this book is the deep relation between the spacings between zeros of zeta and  $L$ -functions and spacings between eigenvalues of random elements of large compact classical groups. This relation, the Montgomery-Odlyzko law, is shown to hold for wide classes of zeta and  $L$ -functions over finite fields. The book draws on, and gives accessible accounts of, many disparate areas of mathematics, from algebraic geometry, moduli spaces, monodromy, equidistribution, and Weil conjectures, to probability theory on the compact classical groups in the limit as their dimension goes to infinity and related techniques from orthogonal polynomials and Fredholm determinants.

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

**Contents:** Statements of the main results; Reformulation of the main results; Reduction steps in proving the main theorems; Test functions; Haar measure; Tail estimates; Large  $N$  limits and Fredholm determinants; Several variables; Equidistribution; Monodromy of families of curves; Monodromy of some other families; GUE discrepancies in various families; Distribution of low-lying Frobenius eigenvalues in various families; Appendix AD: Densities; Appendix AG: Graphs; References.

### Colloquium Publications

October 1998, approximately 416 pages, Hardcover, ISBN 0-8218-1017-0, LC 98-20459, 1991 *Mathematics Subject Classification*: 11G25, 14G10, 60Fxx, 14D05; 11Y35, 82Bxx, 11M06, **Individual member \$41**, List \$69, Institutional member \$55, Order code COLL-KATZN



## The Book of Involutions

**Max-Albert Knus**, Eidgenössische Technische Hochschule, Zürich, Switzerland, **Alexander Merkurjev**, University of California, Los Angeles, **Markus Rost**, Universität at Regensburg, Germany, and **Jean-Pierre Tignol**, Université Catholique de Louvain, Louvain-la-Neuve, Belgium

This monograph is an exposition of the theory of central simple algebras with involution, in relation to linear algebraic groups. It provides the algebra-theoretic foundations for much of the recent work on linear algebraic groups over arbitrary fields. Involutions are viewed as twisted forms of (hermitian) quadrics, leading to new developments on the model of the algebraic theory of quadratic forms. In addition to classical groups, phenomena related to triality are also discussed, as well as groups of type  $F_4$  or  $G_2$  arising from exceptional Jordan or composition algebras. Several results and notions appear here for the first time, notably the discriminant algebra of an algebra with unitary involution and the algebra-theoretic counterpart to linear groups of type  $D_4$ . This volume also contains a Bibliography and Index.

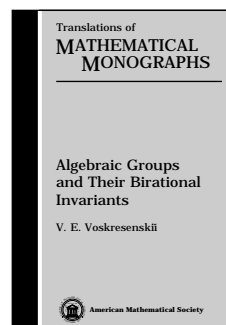
### Features:

- original material not in print elsewhere
- a comprehensive discussion of algebra-theoretic and group-theoretic aspects
- extensive notes that give historical perspective and a survey on the literature
- rational methods that allow possible generalization to more general base rings

**Contents:** Involutions and Hermitian forms; Invariants of involutions; Similitudes; Algebras of degree four; Algebras of degree three; Algebraic groups; Galois cohomology; Composition and triality; Cubic Jordan algebras; Trialitarian central simple algebras; Bibliography; Index; Notation.

### Colloquium Publications, Volume 44

August 1998, 593 pages, Hardcover, ISBN 0-8218-0904-0, LC 98-22202, 1991 *Mathematics Subject Classification*: 11E39, 11E57, 11E72; 11E88, 16K20, 16W10, 17A75, 17C40, 20G15, **All AMS members \$55**, List \$69, Order code COLL/44N



## Algebraic Groups and Their Birational Invariants

**V. E. Voskresenskiĭ**, Samara State University, Russia

Since the late 1960s, methods of birational geometry have been used successfully in the theory of linear algebraic groups, especially in arithmetic problems. This book—which can be viewed as a significant revision

of the author's book, *Algebraic Tori* (Nauka, Moscow, 1977)—

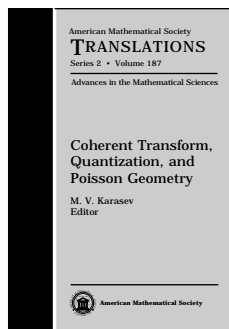
studies birational properties of linear algebraic groups focusing on arithmetic applications. The main topics are forms and Galois cohomology, the Picard group and the Brauer group, birational geometry of algebraic tori, arithmetic of algebraic groups, Tamagawa numbers,  $R$ -equivalence, projective toric varieties, invariants of finite transformation groups, and index-formulas. Results and applications are recent. There is an extensive bibliography with additional comments that can serve as a guide for further reading.

**Contents:** Forms and Galois cohomology; Birational geometry of algebraic tori; Invariants of finite transformation groups; Arithmetic of linear algebraic groups; Tamagawa numbers;  $R$ -equivalence in algebraic groups; Index formulas in arithmetic of algebraic tori; Bibliographical remarks; References.

**Translations of Mathematical Monographs**

September 1998, approximately 227 pages, Hardcover, ISBN 0-8218-0905-9, 1991 *Mathematics Subject Classification:* 20G15, 20G30; 14G05, 14G25, **Individual member \$59**, List \$99, Institutional member \$79, Order code MMONO-VOSKRESENSN

## Analysis



### Coherent Transform, Quantization, and Poisson Geometry

**M. V. Karasev**, *Moscow Institute of Electronics and Mathematics, Russia*, Editor

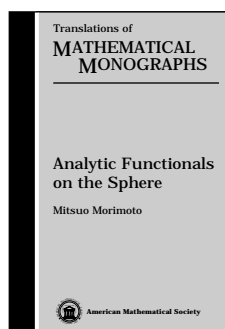
This volume contains three extensive articles written by Karasev and his pupils. Topics covered include the following: coherent states and irre-

ducible representations for algebras with non-Lie permutation relations, Hamilton dynamics and quantization over stable isotropic submanifolds, and infinitesimal tensor complexes over degenerate symplectic leaves in Poisson manifolds. The articles contain many examples (including from physics) and complete proofs.

**Contents:** M. Karasev and E. Novikova, Non-Lie permutation relations, coherent states, and quantum embedding; M. Karasev and Y. Vorobjev, Adapted connections, Hamilton dynamics, geometric phases, and quantization over isotropic submanifolds; V. Itskov, M. Karasev, and Y. Vorobjev, Infinitesimal Poisson cohomology.

**American Mathematical Society Translations—Series 2** (*Advances in the Mathematical Sciences*), Volume 187

September 1998, approximately 376 pages, Hardcover, ISBN 0-8218-1178-9, LC 91-640741, 1991 *Mathematics Subject Classification:* 58F05, 81R30, 70H05, 81Sxx; 33Cxx, 51H15, 53C05, **Individual member \$71**, List \$119, Institutional member \$95, Order code TRANS2/187N



### Analytic Functionals on the Sphere

**Mitsuo Morimoto**, *International Christian University, Tokyo, Japan*

This book treats spherical harmonic expansion of real analytic functions and hyperfunctions on the sphere. Because a one-dimensional sphere is a circle, the simplest example of the theory is that of Fourier series of periodic functions.

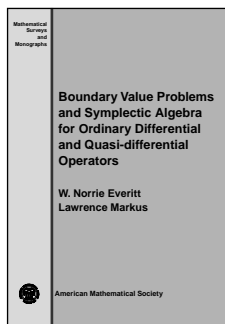
The author first introduces a system of complex neighborhoods of the sphere by means of the Lie norm. He then studies holomorphic functions and analytic functionals on the complex sphere. In the one-dimensional case, this corresponds to the study of holomorphic functions and analytic functionals on the annular set in the complex plane, relying on the Laurent series expansion. In this volume, it is shown that the same idea still works in a higher-dimensional sphere. The Fourier-Borel transformation of analytic functionals on the sphere is also examined; the eigenfunction of the Laplacian can be studied in this way.

**Contents:** Fourier expansion of hyperfunctions on the circle; Spherical harmonic expansion of functions on the sphere; Harmonic functions on the Lie ball; Holomorphic functions on the complex sphere; Holomorphic functions on the Lie ball; Entire functions of exponential type; Fourier-Borel transformation on the complex sphere; Spherical Fourier-Borel transformation on the Lie ball; Bibliography; Index.

**Translations of Mathematical Monographs**

September 1998, approximately 170 pages, Hardcover, ISBN 0-8218-0585-1, LC 98-23076, 1991 *Mathematics Subject Classification:* 46F15; 32A25, 32A45, 32C35, 58G07, **Individual member \$39**, List \$65, Institutional member \$52, Order code MMONO-MORIMOTO2N

## Differential Equations



### Boundary Value Problems and Symplectic Algebra for Ordinary Differential and Quasi-differential Operators

**W. Norrie Everitt**, *University of Birmingham, UK*, and **Lawrence Markus**, *University of Minnesota, Minneapolis*

In the classical theory of self-adjoint boundary value problems for linear ordinary differential operators there is a fundamental, but rather mysterious, interplay between the symmetric (conjugate) bilinear scalar product of the basic Hilbert space and the skew-symmetric boundary form of the

associated differential expression. This book presents a new conceptual framework, leading to an effective structured method, for analyzing and classifying all such self-adjoint boundary conditions. The program is carried out by introducing innovative new mathematical structures which relate the Hilbert space to a complex symplectic space. This work offers the first systematic detailed treatment in the literature of these two topics: complex symplectic spaces—their geometry and linear algebra—and quasi-differential operators.

#### Features:

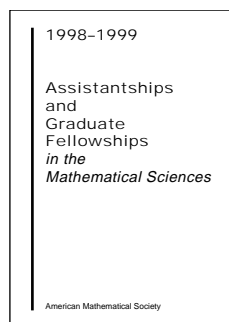
- Authoritative and systematic exposition of the classical theory for self-adjoint linear ordinary differential operators (including a review of all relevant topics in texts of Naimark, and Dunford and Schwartz).
- Introduction and development of new methods of complex symplectic linear algebra and geometry and of quasi-differential operators, offering the only extensive treatment of these topics in book form.
- New conceptual and structured methods for self-adjoint boundary value problems.
- Extensive and exhaustive tabulations of all existing kinds of self-adjoint boundary conditions for regular and for singular ordinary quasi-differential operators of all orders up through six.

**Contents:** Introduction: Fundamental algebraic and geometric concepts applied to the theory of self-adjoint boundary value problems; Maximal and minimal operators for quasi-differential expressions, and GKN-theory; Symplectic geometry and boundary value problems; Regular boundary value problems; Singular boundary value problems; Appendix A. Constructions for quasi-differential operators; Appendix B. Complexification of real symplectic spaces, and the real GKN-theorem for real operators; References.

#### Mathematical Surveys and Monographs

October 1998, approximately 200 pages, Hardcover, ISBN 0-8218-1080-4, 1991 *Mathematics Subject Classification*: 34B05, 34L05, 58F05; 11E39, 47B25, 47E05, **Individual member \$29**, List \$49, Institutional member \$39, Order code SURV-EVERITTN

## General and Interdisciplinary



### Assistantships and Graduate Fellowships in the Mathematical Sciences, 1998-1999

This publication is an indispensable source of information for students seeking support for graduate study in the mathematical sciences. Providing data from a broad range of academic

institutions, it is also a valuable resource for mathematical sciences departments and faculty.

*Assistantships and Graduate Fellowships* brings together a wealth of information about resources available for graduate study in mathematical sciences departments in the U.S. and

Canada. Information on the number of faculty, graduate students, and degrees awarded (bachelor's, master's, and doctoral) is listed for each department when provided. Stipend amounts and the number of awards available are given, as well as information about foreign language requirements. Numerous display advertisements from mathematical sciences departments throughout the country provide additional information.

Also listed are sources of support for graduate study and travel, summer internships, and graduate study in the U.S. for foreign nationals. Finally, a list of reference publications for fellowship information makes *Assistantships and Graduate Fellowships* a centralized and comprehensive resource.

October 1998, approximately 136 pages, Softcover, ISBN 0-8218-1070-7, 1991 *Mathematics Subject Classification*: 00, **Individual member \$12**, List \$20, Order code ASST/98N



### S. S. Chern: A Great Geometer of the Twentieth Century Expanded Edition

S.-T. Yau, *Harvard University, Cambridge, MA*, Editor

This is an expanded edition of a previous work. Two chapters have been added to this revised edition.

In the summer of 1990, S. Y. Cheng and S.-T. Yau organized a conference in Los Angeles in honor of their professor, S. S. Chern, on the occasion of his seventy-ninth birthday. Published here are personal reminiscences from Chern's large group of friends and students. These lectures reflect the wisdom of this great mathematician and his warmth in interacting with young geometers. The editors hope that through this book, readers might get a glimpse of the life of a great geometer.

*International Press* publications are distributed worldwide, except in Japan, by the American Mathematical Society.

**Contents:** S. S. Chern, My mathematical education; R. Palais and C. Terng, The life and mathematics of Shiing-Shen Chern, Dedicated to S. S. Chern for the celebration of his 79th birthday; C. N. Yang, S. S. Chern and I; A. Weil, S. S. Chern as geometer and friend; W. Chow, Shiing-Shen Chern, as friend and mathematician, a reminiscence on the occasion of his 80th birthday; I. M. Singer, S. S. Chern at Chicago; P. C. W. Chu, Professor S. S. Chern, my father-in-law; I. Kaplansky, Shiing-Shen Chern, with admiration as he approaches his 80th birthday; L. Nirenberg, Some personal remarks about S. S. Chern; F. E. Browder, S. S. Chern; R. Lashof, Personal recollection of Chern at Chicago; R. Bott, For the Chern volume; L. Auslander, S. S. Chern as teacher; H. Suzuki, Reminiscences and acknowledgements; P. A. Griffiths, Professor S. S. Chern, 79th birthday celebration; W. Stoll, Shiing-Shen Chern's influence on value distribution; dedicated to Shiing-Shen Chern; W. Klingenberg, My encounters with S. S. Chern; F. Haab and N. H. Kuiper, On the normal Gauss map of a tight smooth surface in  $R^3$ ; J. Simons, My interaction with S. S. Chern; M. P. do Carmo, S. S. Chern: Mathematical influences and reminiscences; M. Burger, Riemannian manifolds: From curvature to topology, a brief historical overview; B. Lawson, On Chern and youth; J. Cheeger, Remarks delivered at Chern's 79th birthday celebration; A. Weinstein, Some thoughts about S. S.

Chern; **R. Greene**, Some mathematical and personal reminiscences; **S. Y. Cheng**, My teacher S. S. Chern; **S. M. Webster**, On being a Chern student; **J. P. Bourguignon**, Shiing-Shen Chern, an optimist; **J. Wolfson**, Chern, some recollections; **S.-T. Yau**, S. S. Chern, as my teacher; **S.-T. Yau**, Open problems in differential geometry; **C.-C. Hsiung**, My associations with S. S. Chern; **T. Banchoff**, Becoming and being a Chern student.

**International Press**

1998, 331 pages, Hardcover, ISBN 1-57146-098-5, 1991 *Mathematics Subject Classification*: 53-03; 01A60, 01A70, All AMS members \$34, List \$42, Order code INPR/14N



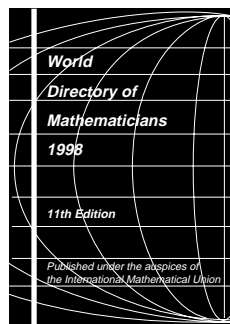
## Combined Membership List 1998-1999

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 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 four 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 four 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 four 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.

November 1998, approximately 392 pages, Softcover, ISBN 0-8218-1089-8, 1991 *Mathematics Subject Classification*: 00, **Individual member \$37**, List \$62, Institutional member \$50, Order code CML/98/99N



## World Directory of Mathematicians 1998

This 11th edition of the *World Directory of Mathematicians* 1998 incorporates updates and corrections to the 1994 edition, as well as nearly 30 percent more names. Published by the International Mathematical Union, this valuable reference contains the names and addresses of over 50,000 mathematicians from 69 countries.

There is also an increase in the number of fax numbers and email addresses in this edition. Listings for the directory are arranged both alphabetically and geographically and are based on information supplied by

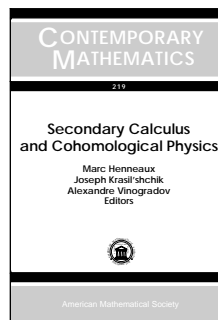
National Committees for Mathematics (or corresponding organizations). Libraries, mathematics departments, and individuals will find this new edition to be a valuable resource for its extensive coverage of the international mathematical community.

**Contents:** Preface; Ordering; List of Main Abbreviations; Members of the International Mathematical Union; List of Mathematical Organizations; Alphabetical List of Mathematicians; Geographical List of Mathematicians

Published by the International Mathematical Union.

August 1998, 1093 pages, Softcover, 1991 *Mathematics Subject Classification*: 00, All Individuals \$40, List \$65, Order code WRLDIR/11N

## Mathematical Physics



## Secondary Calculus and Cohomological Physics

**Marc Henneaux**, *Université Libre de Bruxelles, Belgium*, **Joseph Krasil'shchik**, *Moscow Institute for Municipal Economy, Russia*, and **Alexandre Vinogradov**, *University of Salerno, Italy*, Editors

This collection of invited lectures (at the Conference on Secondary Calculus and Cohomological Physics, Moscow, 1997) reflects the state-of-the-art in a new branch of mathematics and mathematical physics arising at the intersection of geometry of nonlinear differential equations, quantum field theory, and cohomological algebra. This is the first comprehensive and self-contained book on modern quantum field theory in the context of cohomological methods and the geometry of nonlinear PDEs.

**Features:**

- An up-to-date and self-contained exposition of the newest results in cohomological aspects of quantum field theory and the geometry of PDEs.
- A new look at interrelations between cohomology theory, the geometry of PDEs, and field theory.
- Application to Batalin-Vilkovisky formalism, BRST formalism, anomalies, and quantum dynamics.

This text will also be of interest to those working in differential equations and geometry and topology.

**Contents:** **M. Asorey**, **F. Falseto**, and **G. Luzón**, Unstable bundles in quantum field theory; **G. Barnich**, Brackets in the jet-bundle approach to field theory; **C. Becchi**, **S. Giusto**, and **C. Imbimbo**, The BRST structure of twisted  $N = 2$  algebra; **L. Bonora**, **C. S. Chu**, and **M. Rinaldi**, Anomalies and locality in field theories and M-theory; **F. Brandt**, Gauge covariant algebras and local BRST cohomology; **M. Dubois-Violette**, Generalized homologies for  $d^N = 0$  and graded  $q$ -differential algebras; **M. Fliess**, **J. Lévine**, **P. Martin**, and **P. Rouchon**, Nonlinear control and diffieties, with an application to physics; **M. Henneaux**, Consistent interactions between gauge fields: the cohomological approach; **N. Kamran** and **T. Robart**, A compatible analytic manifold structure for Lie pseudogroups

of infinite type; **J. Krasil'shchik**, Cohomology background in geometry of PDE; **N. Maggiore**, Algebraic renormalization of massive supersymmetric theories; **G. Marmo** and **A. Ibort**, A new look at completely integrable systems and double Lie groups; **V. Penna**, **M. Rasetti**, and **M. Spera**, Quantum dynamics of 3-D vortices; **J. D. Stasheff**, The (secret?) homological algebra of the Batalin-Vilkovisky approach; **A. Verbovetsky**, Notes on the horizontal cohomology; **C. M. Viallet**, Invariants of rational transformations and algebraic entropy; **A. Vinogradov**, Introduction to secondary calculus; **A. Vinogradov** and **M. Vinogradov**, On multiple generalizations of Lie algebras and Poisson manifolds.

**Contemporary Mathematics**, Volume 219

June 1998, 287 pages, Softcover, ISBN 0-8218-0828-1, LC 98-22945, 1991 *Mathematics Subject Classification*: 81T70, 35Qxx; 58-06, 81-06, **Individual member \$36**, List \$60, Institutional member \$48, Order code CONM/219N

# 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*

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.

**Translations of Mathematical Monographs**, Volume 173; 1998; 184 pages; Hardcover: ISBN 0-8218-0584-3; List \$75; Individual member \$45; Order code MMONO/173NA

## Short-Time Geometry of Random Heat Kernels

**Richard B. Sowers**, *University of Illinois, Urbana*

This volume studies the behavior of the random heat kernel associated with the stochastic partial differential equation  $du = \frac{1}{2} \Delta u dt + (\sigma, u) dW_t$ , on some Riemannian manifold  $M$ . Here  $\Delta$  is the Laplace-Beltrami operator,  $\sigma$  is some vector field on  $M$ , and  $\nabla$  is the gradient operator. Also,  $W$  is a standard Wiener process and  $\int$  denotes Stratonovich integration. The author gives short-time expansion of this heat kernel. He finds that the dominant exponential term is classical and depends only on the Riemannian distance function. The second exponential term is a work term and also has classical meaning. There is also a third non-negligible exponential term which blows up. The author finds an expression for this third exponential term which involves a random translation of the index form and the equations of Jacobi fields. In the process, he develops a method to approximate the heat kernel to any arbitrary degree of precision.

**Memoirs of the American Mathematical Society**, Volume 132, Number 629; 1998; 130 pages; Softcover; ISBN 0-8218-0649-1; List \$41; Individual member \$25; Order code MEMO/132/629NA



All prices subject to change. Charges for delivery are \$3.00 per order. For optional air delivery outside of the continental U. S., please include \$6.50 per item. *Prepayment required.* Order from: **American Mathematical Society**, P. O. Box 5904, Boston, MA 02206-5904 USA. For credit card orders, fax 1-401-455-4046 or call toll free 1-800-321-4AMS (4267) in the U. S. and Canada, 1-401-455-4000 worldwide. Or place your order through the AMS bookstore at [www.ams.org/bookstore/](http://www.ams.org/bookstore/). Residents of Canada, please include 7% GST.