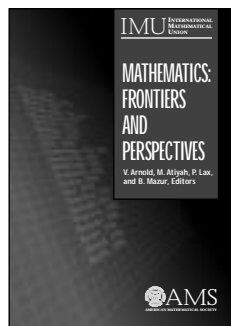


# New Publications Offered by the AMS

## New from the AMS!

Born as part of the activities observing the World Mathematical Year 2000, *Mathematics: Frontiers and Perspectives* contains articles written by some of the most influential mathematicians of our time. Included are valuable reflections on the amazing progress witnessed in mathematics over the last century, as well as speculation about future developments. This work is an important contribution at this notable juncture: The turn of the millennium.

New and Noteworthy



## Mathematics: Frontiers and Perspectives

Vladimir Arnold, *University of Paris IX, France*, and Steklov Mathematical Institute, Moscow, Russia, Michael Atiyah, *University of Edinburgh, Scotland, UK*, Peter Lax, *New York University-Courant*

*Institute, NY*, and Barry Mazur, *Harvard University, Cambridge, MA*, Editors

*The twentieth century has transformed mathematics from a cottage industry run by a few semi-amateurs into a worldwide industry run by an army of professionals ...*

—from the Preface by M. Atiyah

This remarkable book is a celebration of the state of mathematics at the end of the millennium. Produced under the auspices of the International Mathematical Union (IMU), the volume was born as part of the activities observing the World Mathematical Year 2000.

The volume consists of 28 articles written by some of the most influential mathematicians of our time. Authors of 14 contributions were recognized in various years by the IMU as recipients of the Fields Medal, from K. F. Roth (Fields Medalist, 1958) to W. T. Gowers (Fields Medalist, 1998). The articles offer valuable reflections about the amazing mathematical progress we have witnessed in this century and insightful speculations about the possible development of mathematics over the next century.

Some articles formulate important problems, challenging future mathematicians. Others pay explicit homage to the famous set of Hilbert Problems posed one hundred years ago, giving enlightening commentary. Yet other papers offer a deeply personal perspective, allowing singular insight into the minds and hearts of people doing mathematics today.

*Mathematics: Frontiers and Perspectives* is a unique volume that pertains to a broad mathematical audience of various

backgrounds and levels of interest. It offers readers true and unequalled insight into the wonderful world of mathematics at this important juncture: the turn of the millennium.

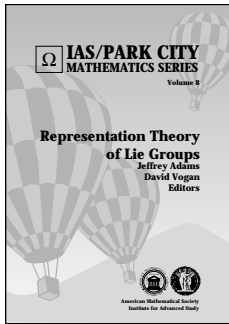
The work is one of those rare volumes that can be browsed, and if you do simply browse through it, you get a wonderful sense of mathematics today. Yet it also can be intensely studied on a detailed technical level for gaining insight into some of the great problems on which mathematicians are currently working.

Individual members of mathematical societies of the IMU member countries can purchase this volume at the AMS member price when buying directly from the AMS.

**Contents:** A. Baker and G. Wüstholz, Number theory, transcendence and Diophantine geometry in the next millennium; J. Bourgain, Harmonic analysis and combinatorics: How much may they contribute to each other?; S.-S. Chern, Back to Riemann; A. Connes, Noncommutative geometry and the Riemann zeta function; S. K. Donaldson, Polynomials, vanishing cycles and Floer homology; W. T. Gowers, The two cultures of mathematics; V. F. R. Jones, Ten problems; D. Kazhdan, An algebraic integration; F. Kirwan, Mathematics: The right choice?; P.-L. Lions, On some challenging problems in nonlinear partial differential equations; A. J. Majda, Real world turbulence and modern applied mathematics; Yu. I. Manin, Mathematics as profession and vocation; G. Margulis, Problems and conjectures in rigidity theory; D. McDuff, A glimpse into symplectic geometry; S. Mori, Rational curves on algebraic varieties; D. Mumford, The dawning of the age of stochasticity; R. Penrose, Mathematical physics of the 20<sup>th</sup> and 21<sup>st</sup> centuries; K. F. Roth, Limitations to regularity; D. Ruelle, Conversations on mathematics with a visitor from outer space; P. Sarnak, Some problems in number theory, analysis and mathematical physics; S. Smale, Mathematical problems for the next century; R. P. Stanley, Positivity problems and conjectures in algebraic combinatorics; C. Vafa, On the future of mathematics/physics interaction; A. Wiles, Twenty years of number theory; E. Witten, Magic, mystery, and matrix; S.-T. Yau, Review of geometry and analysis; V. I. Arnold, Polymathematics: Is mathematics a single science or a set of arts?; P. D. Lax, Mathematics and computing; B. Mazur, The theme of  $p$ -adic variation.

February 2000, approximately 433 pages, Hardcover, ISBN 0-8218-2070-2, LC 99-047980, 2000 *Mathematics Subject Classification*: 00B10; 00B15, All AMS members \$39, List \$49, Order code MFPPN

# Algebra and Algebraic Geometry



## Representation Theory of Lie Groups

**Jeffrey Adams**, *University of Maryland, College Park*, and **David Vogan**, *Massachusetts Institute of Technology*, Cambridge, Editors

This book contains written versions of the lectures given at the PCMI Graduate Summer School on the

representation theory of Lie groups. The volume begins with lectures by A. Knapp and P. Trapa outlining the state of the subject around the year 1975, specifically the fundamental results of Harish-Chandra on the general structure of infinite-dimensional representations and the Langlands classification.

Additional contributions outline developments in four of the most active areas of research over the past 20 years. The clearly written articles present results to date, as follows: R. Zierau and L. Barchini discuss the construction of representations on Dolbeault cohomology spaces. D. Vogan describes the status of the Kirillov-Kostant “philosophy of coadjoint orbits” for unitary representations. K. Vilonen presents recent advances in the theory of “localization” introduced by Beilinson and Bernstein. And Jian-Shu Li covers Howe’s theory of “dual reductive pairs”.

Each contributor to the volume presents the topics in a unique, comprehensive, and accessible manner geared toward advanced graduate students and researchers. Students should have completed the standard introductory graduate courses for full comprehension of the work. The book would also serve well as a supplementary text for a course on introductory infinite-dimensional representation theory.

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

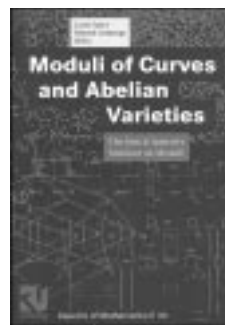
Members of the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM) receive a 20% discount from list price.

**Contents:** *A. W. Knapp and P. E. Trapa, Representations of semisimple Lie groups:* Introduction; Some representations of  $SL(n, \mathbb{R})$ ; Semisimple groups and structure theory; Introduction to representation theory; Cartan subalgebras and highest weights; Action by the Lie algebra; Cartan subgroups and global characters; Discrete series and asymptotics; Langlands classification; Bibliography; *R. Zierau, Representations in Dolbeault cohomology:* Introduction; Complex flag varieties and orbits under a real form; Open  $G_0$ -orbits; Examples, homogeneous bundles; Dolbeault cohomology, Bott-Borel-Weil theorem; Indefinite harmonic theory; Intertwining operators I; Intertwining operators II; The linear cycle space; Bibliography; *L. Barchini, Unitary representations attached to elliptic orbits. A geometric approach:* Introduction; Globalizations; Dolbeault cohomology and maximal globalization;  $L^2$ -cohomology and discrete series representations; Indefinite quantization; Bibliography; *D. A. Vogan, Jr., The method of adjoint orbits for real reductive groups:* Introduction; Some ideas from mathematical physics; The Jordan decomposition and three kinds of quantization; Complex polarizations; The Kostant-Sekiguchi

correspondence; Quantizing the action of  $K$ ; Associated graded modules; A good basis for associated graded modules; Proving unitarity; Exercises; Bibliography; *K. Vilonen, Geometric methods in representation theory:* Introduction; Overview; Derived categories of constructible sheaves; Equivariant derived categories; Functors to representations; Matsuki correspondence for sheaves; Characteristic cycles; The character formula; Microlocalization of Matsuki = Sekiguchi; Homological algebra (appendix by M. Hunziker); Bibliography; *Jian-Shu Li, Minimal representations and reductive dual pairs:* Introduction; The oscillator representation; Models; Duality; Classification; Unitarity; Minimal representations of classical groups; Dual pairs in simple groups; Bibliography.

IAS/Park City Mathematics Series, Volume 8

February 2000, approximately 340 pages, Hardcover, ISBN 0-8218-1941-0, LC 99-051732, 2000 *Mathematics Subject Classification:* 22E46; 43A85, 57S25, All AMS members \$39, List \$49, Order code PCMS/8N



## Moduli of Curves and Abelian Varieties

**Carel Faber**, *Oklahoma State University, Stillwater*, and **Eduard Looijenga**, *University of Utrecht, Netherlands*, Editors

A publication of Vieweg Verlag.

This volume grew out of the Dutch Intercity Seminar on Moduli. It

contains articles from the seminar and also contains new work.

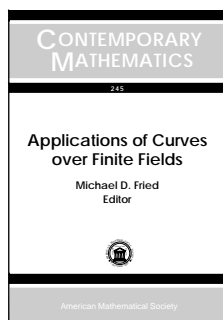
Topics presented include a stratification of a moduli space of abelian varieties in positive characteristic and the calculation of the classes of the strata, tautological classes for moduli spaces of curves, locally symmetric families of curves and jacobians, and the role of symmetric product spaces in quantum field theory, string theory, and matrix theory.

The AMS is exclusive distributor in North America, and non-exclusive distributor worldwide except in Germany, Switzerland, Austria, and Japan.

**Contents:** **G. van der Geer** and **F. Oort**, Moduli of Abelian varieties: A short introduction and survey; **C. Faber** and **E. Looijenga**, Remarks on moduli of curves; **F. Oort**, A stratification of a moduli space of polarized Abelian varieties in positive characteristic; **G. van der Geer**, Cycles on the moduli space of Abelian varieties; **R. Hain**, Locally symmetric families of curves and Jacobians; **C. Faber**, A conjectural description of the tautological ring of the moduli space of curves; **E. Looijenga**, Correspondences between moduli spaces of curves; **R. Dijkgraaf**, Fields, strings, matrices and symmetric products.

Vieweg Aspects of Mathematics

June 1999, 200 pages, Hardcover, ISBN 3-528-03125-5, 2000 *Mathematics Subject Classification:* 14H10, 14H15, 14K10, All AMS members \$53, List \$59, Order code VWAM/33N



## Applications of Curves over Finite Fields

Michael D. Fried, *University of California, Irvine*, Editor

This volume presents the results of the AMS-IMS-SIAM Joint Summer Research Conference held at the University of Washington (Seattle). The talks were devoted to various aspects of the

theory of algebraic curves over finite fields and its numerous applications. The three basic themes are the following:

- 1. Curves with many rational points.** Several articles describe main approaches to the construction of such curves: the Drinfeld modules and fiber product methods, the moduli space approach, and the constructions using classical curves.
- 2. Monodromy groups of characteristic  $p$  covers.** A number of authors presented the results and conjectures related to the study of the monodromy groups of curves over finite fields. In particular, they study the monodromy groups from genus 0 covers, reductions of covers, and explicit computation of monodromy groups over finite fields.
- 3. Zeta functions and trace formulas.** To a large extent, papers devoted to this topic reflect the contributions of Professor Bernard Dwork and his students. This conference was the last attended by Professor Dwork before his death, and several papers inspired by his presence include commentaries about the applications of trace formulas and  $L$ -function.

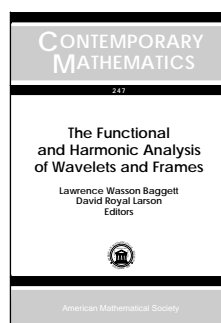
The volume also contains a detailed introduction paper by Professor Michael Fried, which helps the reader to navigate in the material presented in the book.

**Contents:** *Beyond Weil bounds; Curves with many rational points:* H. Niederreiter and C. Xing, Curve sequences with asymptotically many rational points; Y. Ihara, Shimura curves over finite fields and their rational points; D. R. Hayes, Distribution of minimal ideals in imaginary quadratic function fields; Z. Chen, Division points of Drinfeld modules and special values of Weil  $L$ -functions; G. van der Geer and M. van der Vlugt, Constructing curves over finite fields with many points by solving linear equations; A. Garcia and F. Torres, On maximal curves having classical Weierstrass gaps; *Monodromy groups of characteristic  $p$  curves:* S. S. Abhyankar and P. A. Loomis, Twice more nice equations for nice groups; N. D. Elkies, Linearized algebra and finite groups of Lie type: I: Linear and symplectic groups; P. Dèbes, Regular realization of abelian groups with controlled ramification; M. Emsalem, On reduction of covers of arithmetic surfaces; L. M. Adleman and M.-D. Huang, Function field sieve method for discrete logarithms over finite fields; *Zeta functions and trace formulas:* D. Wan, A quick introduction to Dwork's conjecture; A. Adolphson and S. Sperber, On the degree of the zeta function of a complete intersection; F. Leprévost, The modular points of a genus 2 quotient of  $X_0(67)$ ; C.-L. Chai and W.-C. W. Li, Function fields: Arithmetic applications; F. Chung, Spanning trees in subgraphs of lattices; M. Rosen, Average rank for elliptic curves and a conjecture of Nagao.

**Contemporary Mathematics**, Volume 245

December 1999, 226 pages, Softcover, ISBN 0-8218-0925-3, LC 99-043767, 2000 *Mathematics Subject Classification*: 11G20, 11R58, 11G18, 11G09; 11S15, 11F32, 11R32, 11T55, 11T71, 12H25, **Individual member \$23**, List \$39, Institutional member \$31, Order code CONM/245N

## Analysis



## The Functional and Harmonic Analysis of Wavelets and Frames

Lawrence Wasson Baggett, *University of Colorado, Boulder*, and David Royal Larson, *Texas A & M University, College Station*, Editors

Over the past decade, wavelets and frames have emerged as increasingly

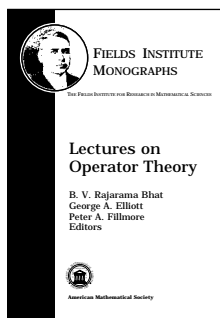
powerful tools of analysis on  $n$ -dimension Euclidean space. Both wavelets and frames were studied initially by using classical Fourier analysis. However, in recent years more abstract tools have been introduced, for example, from operator theory, abstract harmonic analysis, von Neumann algebras, etc.

The editors of this volume organized a Special Session on the functional and harmonic analysis of wavelets at the San Antonio (TX) Joint Mathematics Meetings. The goal of the session was to focus research attention on these newly-introduced tools and to share the organizers' view that this modern application holds the promise of providing some deeper understanding and fascinating new structures in pure functional analysis. This volume presents the fruitful results of the lively discussions that took place at the conference.

**Contents:** A. Aldroubi and P. Basser, Reconstruction of vector and tensor fields from sampled discrete data; L. W. Baggett and K. D. Merrill, Abstract harmonic analysis and wavelets in  $\mathbb{R}^n$ ; R. Balan, Density and redundancy of the noncoherent Weyl-Heisenberg superframes; J. J. Benedetto and M. T. Leon, The construction of multiple dyadic minimally supported frequency wavelets on  $\mathbb{R}^d$ ; L. Brandolini, G. Garrigós, Z. Rzesotnik, and G. Weiss, The behaviour at the origin of a class of band-limited wavelets; O. Bratteli and P. E. T. Jorgensen, Convergence of the cascade algorithm at irregular scaling functions; P. G. Casazza, O. Christensen, and A. J. E. Janssen, Classifying tight Weyl-Heisenberg frames; P. G. Casazza, D. Han, and D. R. Larson, Frames for Banach spaces; J. Courter, Construction of dilation- $d$  wavelets; M. Frank and D. R. Larson, A module frame concept for Hilbert  $C^*$ -modules; J. Gasch and J. E. Gilbert, Triangularization of Hankel operators and the bilinear Hilbert transform; R. F. Gundy, Two remarks concerning wavelets: Cohen's criterion for low-pass filters and Meyer's theorem on linear independence; D. Han, D. R. Larson, M. Papadakis, and Th. Stavropoulos, Multiresolution analyses of abstract Hilbert spaces and wandering subspaces; G. Strang, V. Strela, and D.-X. Zhou, Compactly supported refinable functions with infinite masks; E. Weber, Applications of the wavelet multiplicity function.

**Contemporary Mathematics**, Volume 247

January 2000, 306 pages, Softcover, ISBN 0-8218-1957-7, LC 99-052140, 2000 *Mathematics Subject Classification*: 41-XX, 42-XX, 43-XX, 46-XX, 47-XX, **Individual member \$45**, List \$75, Institutional member \$60, Order code CONM/247N



## Lectures on Operator Theory

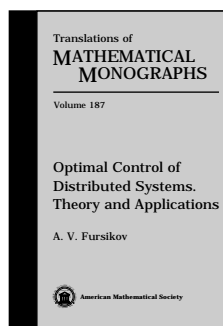
**B. V. Rajarama Bhat**, *Indian Statistical Institute, Bangalore*,  
**George A. Elliott**, *University of Toronto, ON, Canada*, and  
**Peter A. Fillmore**, *Dalhousie University, Halifax, NS, Canada*, Editors

This book resulted from the lectures held at The Fields Institute (Waterloo, ON, Canada). Leading international experts presented current results on the theory of  $C^*$ -algebras and von Neumann algebras, together with recent work on the classification of  $C^*$ -algebras. Much of the material in the book is appearing here for the first time and is not available elsewhere in the literature.

**Contents:** *C\*-algebras:*  $C^*$ -algebras: Definitions and examples;  $C^*$ -algebras: Constructions; Positivity in  $C^*$ -algebras; K-theory I; Tensor products of  $C^*$ -algebras; Crossed products I; Crossed products II: Examples; Free products; K-theory II: Roots in topology and index theory;  $C^*$ -algebraic K-theory made concrete or trick or treat with  $2 \times 2$  matrix algebras; Dilation theory;  $C^*$ -algebras and mathematical physics;  $C^*$ -algebras and several complex variables; *von Neumann algebras:* Basic structure of von Neumann algebras; von Neumann algebras (Type  $II_1$  factors); The equivalence between injectivity and hyperfiniteness, part I; The equivalence between injectivity and hyperfiniteness, part II; On the Jones index; Introductory topics on subfactors; The Tomita-Takesaki theory explained; Free products of von Neumann algebras; Semigroups of endomorphisms of  $\mathcal{B}(H)$ ; Classification of  $C^*$ -algebras; AF-algebras and Bratteli diagrams; Classification of amenable  $C^*$ -algebras I; Classification of amenable  $C^*$ -algebras II; Simple  $A1$ -algebras and the range of the invariant; Classification of simple purely infinite  $C^*$ -algebras I; *Hereditary subalgebras of certain simple non real rank zero C\*-algebras:* Preface; Introduction; The isomorphism theorem; The range of the invariant; Bibliography; *Paths on Coxeter diagrams: From platonic solids and singularities to minimal models and subfactors:* Preface/Acknowledgements; The Kauffman-Lins recoupling theory; Graphs and connections; An extension of the recoupling model; Relations to minimal models and subfactors; Bibliography.

**Fields Institute Monographs**, Volume 13

January 2000, 344 pages, Hardcover, ISBN 0-8218-0821-4, 2000 *Mathematics Subject Classification:* 46L05, 46L10; 46L37, 46L80, 46L85, **All AMS members \$55**, List \$69, Order code FIM/13N



## Optimal Control of Distributed Systems. Theory and Applications

**A. V. Fursikov**, *Moscow State University, Russia*

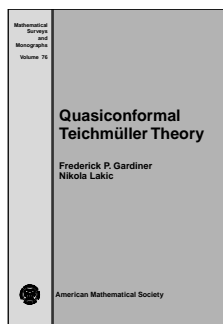
This volume presents the analysis of optimal control problems for systems described by partial differential equations.

The book offers simple and clear exposition of main results in this area. The methods proposed by the author cover cases where the controlled system corresponds to well-posed or ill-posed boundary value problems, which can be linear or nonlinear. The uniqueness problem for the solution of nonlinear optimal control problems is analyzed in various settings. Solutions of several previously unsolved problems are given. In addition, general methods are applied to the study of two problems connected with optimal control of fluid flows described by the Navier-Stokes equations.

**Contents:** The existence of solutions to optimal control problems; Optimality system for optimal control problems; The solvability of boundary value problems for a dense set of data; The problem of work minimization in accelerating still fluid to a prescribed velocity; Optimal boundary control for nonstationary problems of fluid flow and nonhomogeneous boundary value problems for the Navier-Stokes equations; The Cauchy problem for elliptic equations in a conditionally well-posed formulation; The local exact controllability of the flow of incompressible viscous fluid; Bibliography; Index.

**Translations of Mathematical Monographs**, Volume 187

December 1999, 305 pages, Hardcover, ISBN 0-8218-1382-X, LC 99-048377, 2000 *Mathematics Subject Classification:* 93C20; 35Q30, 76D05, **All AMS members \$97**, List \$121, Order code MMONO/187N



## Quasiconformal Teichmüller Theory

**Frederick P. Gardiner**, *Brooklyn College, CUNY, NY*, and **Nikola Lakic**, *Lehman College, CUNY, Bronx, NY*

The Teichmüller space  $T(X)$  is the space of marked conformal structures on a given quasiconformal surface  $X$ . This volume uses quasiconformal

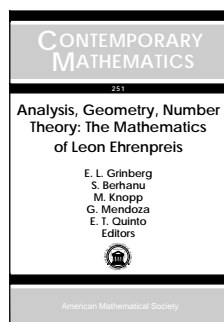
mapping to give a unified and up-to-date treatment of  $T(X)$ . Emphasis is placed on parts of the theory applicable to noncompact surfaces and to surfaces possibly of infinite analytic type.

The book provides a treatment of deformations of complex structures on infinite Riemann surfaces and gives background for further research in many areas. These include applications to fractal geometry, to three-dimensional manifolds through its relationship to Kleinian groups, and to one-dimensional dynamics through its relationship to quasisymmetric mappings. Many research problems in the application of function theory to geometry and dynamics are suggested.

**Contents:** Quasiconformal mapping; Riemann surfaces; Quadratic differentials, Part I; Quadratic differentials, Part II; Teichmüller equivalence; The Bers embedding; Kobayashi's metric on Teichmüller space; Isomorphisms and automorphisms; Teichmüller uniqueness; The mapping class group; Jenkins-Strebel differentials; Measured foliations; Obstacle problems; Asymptotic Teichmüller space; Asymptotically extremal maps; Universal Teichmüller space; Substantial boundary points; Earthquake mappings; Bibliography; Index.

**Mathematical Surveys and Monographs**, Volume 76

January 2000, 372 pages, Hardcover, ISBN 0-8218-1983-6, LC 99-045788, 2000 *Mathematics Subject Classification*: 30F60, 32G15, **Individual member** \$53, List \$89, Institutional member \$71, Order code SURV/76N



## Analysis, Geometry, Number Theory: The Mathematics of Leon Ehrenpreis

**E. L. Grinberg, S. Berhanu, M. Knopp, and G. Mendoza, Temple University, Philadelphia, PA, and E. T. Quinto, Tufts University, Medford, MA, Editors**

This book presents the proceedings from the conference honoring the work of Leon Ehrenpreis. Professor Ehrenpreis worked in many different areas of mathematics and found connections among all of them. For example, one can find his analytic ideas in the context of number theory, geometric thinking within analysis, transcendental number theory applied to partial differential equations, and more. The conference brought together the communities of mathematicians working in the areas of interest to Professor Ehrenpreis and allowed them to share the research inspired by his work.

The collection of articles here presents current research on PDEs, several complex variables, analytic number theory, integral geometry, and tomography. The work of Professor Ehrenpreis has contributed to basic definitions in these areas and has motivated a wealth of research results. This volume offers a survey of the fundamental principles that unified the conference and influenced the mathematics of Leon Ehrenpreis.

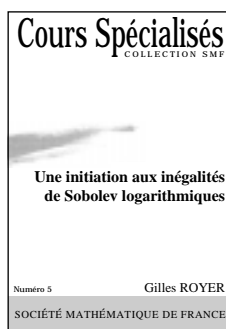
This item will also be of interest to those working in geometry and topology and number theory.

**Contents:** M. Agranovsky, On a problem of injectivity for the Radon transform on a paraboloid; J. C. Álvarez, Anti-self-dual symplectic forms and integral geometry; T. T. Banh, Holomorphic extendibility of functions via nonlinear Fourier transforms; C. A. Berenstein and A. Yger, Division-interpolation methods and Nullstellensätze; J. Boman, Uniqueness and non-uniqueness for microanalytic continuation of ultradistributions; G. Boros and V. H. Moll, A rational Landen transformation. The case of degree six; R. W. Braun, R. Meise, and B. A. Taylor, A perturbation result for linear differential operators admitting a global right inverse on  $\mathcal{D}'$ ; S. Catto, J. Huntley, N. Moh, and D. Tepper, Weyl's law with error estimate; F. Colombo, I. Sabadini, and D. C. Struppa, Dirac equation in the octonionic algebra; W. Culp-Ressler and W. d. A. Pribitkin, A note on Siegel's proof of Hamburger's theorem; A. D'Agnolo, Sheaves and  $\mathcal{D}$ -modules in integral geometry; J. P. D'Angelo, Positivity conditions and squared

norms of holomorphic polynomial mappings; L. Ehrenpreis, P. Kuchment, and A. Panchenko, The exponential x-ray transform and Fritz John's equation. I. Range description; C. L. Epstein and G. M. Henkin, Two lemmas in local analytic geometry; H. M. Farkas and I. Kra, Partitions and theta constant identities; J. Gasqui and H. Goldschmidt, The Radon transform and spectral rigidity of the Grassmannians; D. Geller, Complex powers of convolution operators on the Heisenberg group; A. Greenleaf, A. Seeger, and S. Wainger, Estimates for generalized Radon transforms in three and four dimensions; E. Grinberg and I. Pesenson, Irregular sampling and the Radon transform; P. Guerzhoy, Involution of  $\Lambda$ -adic analytic spaces and the  $U_p$ -operator for half-integral weight modular forms; R. C. Gunning, Maximal sequences of compact Riemann surfaces; J. Hounie and J. Tavares, On BMO singularities of solutions of analytic complex vector fields; A. A. Himonas and G. Misiolek, The initial value problem for a fifth order shallow water equation on the real line; X. Huang, J. Merker, and F. Meylan, Mappings between degenerate real analytic hypersurfaces in  $C^n$ ; A. Katsevich, Analysis of artifacts in local tomography with nonsmooth attenuation; M. I. Knopp and W. d. A. Pribitkin, The Hecke convergence factor and modular forms of weight zero; J. J. Kohn, Hypoellipticity at points of infinite type; M. Derridj and D. S. Tartakoff, Semi-global analytic regularity for  $\bar{\partial}_b$  on CR submanifolds of  $\mathbb{C}^2$ ; L. Lanzani, Cauchy transform and Hardy spaces for rough planar domains; A. Mezzani, On real analytic planar vector fields near the character set; A. M. Odlyzko and E. M. Rains, On longest increasing subsequences in random permutations; P. C. Pasles, Convergence of Poincaré series with two complex coweights; W. d. A. Pribitkin, Eisenstein series and Eichler integrals; N. K. Stanton, Real hypersurfaces with no infinitesimal CR automorphisms; F. Treves, Extension of cohomology classes; Y. Zhou and E. T. Quinto, Two-radius support theorems for spherical Radon transforms on manifolds.

**Contemporary Mathematics**, Volume 251

February 2000, approximately 463 pages, Softcover, ISBN 0-8218-1148-7, LC 99-049187, 2000 *Mathematics Subject Classification*: 00B25, **Individual member** \$57, List \$95, Institutional member \$76, Order code CONM/251N



## Une Initiation aux Inégalités de Sobolev Logarithmiques

**Gilles Royer, Université d'Orléans, France**

*A publication of Société Mathématique de France.*

The book starts with an introduction to logarithmic Sobolev inequalities. Then the author shows how these

inequalities are used in mathematical statistical physics to prove the ergodicity of certain unbounded lattice spins systems with weak interactions. Only a narrow angle in the wide domain of Gibbs measures is considered in the book, but it is an important development by B. Zegarlinski of one of R. L. Dobrushin's fundamental ideas about describing a random field in terms of conditional probabilities. The book provides most of the required basic notions, such as self-adjoint operators, diffusion processes and Gibbs measures. Some complements and exercises are also provided.

*Continued*

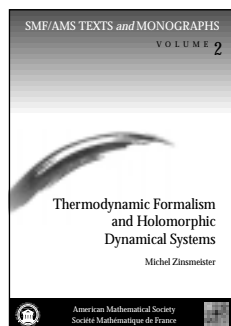
This item will also be of interest to those working in mathematical physics.

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:** Opérateurs autoadjoints; Semi-groupes; Inégalités de Sobolev logarithmiques; Mesures de Gibbs; Stabilisation de la dynamique de Langevin; Appendice; Bibliographie.

**Cours Spécialisés—Collection SMF, Number 5**

May 1999, 114 pages, Softcover, ISBN 2-85629-075-2, 2000 *Mathematics Subject Classification:* 47A35, 60J60, 60K35, 35J85, 82C20, **Individual member \$23**, List \$26, Order code COSP/5N



## Thermodynamic Formalism and Holomorphic Dynamical Systems

Michel Zinsmeister

The purpose of thermodynamics and statistical physics is to understand the equilibrium of a gas or the different states of matter. To understand the strange fractal sets appearing when

one iterates a quadratic polynomial is one of the goals of the theory of holomorphic dynamical systems. These two theories are strongly linked: The laws of thermodynamics happen to be an extremely powerful tool for understanding the objects of holomorphic dynamical systems. A “thermodynamic formalism” has been developed, bringing together notions that are a priori unrelated. While the deep reasons of this parallelism remain unknown, the goal of this book is to describe this formalism both from the physical and mathematical point of view in order to understand how it works and how useful it can be.

This translation is a slightly revised version of the original French edition. The main changes are in Chapters 5 and 6 and consist of clarification of some proofs and a new presentation of the basics in iteration of polynomials.

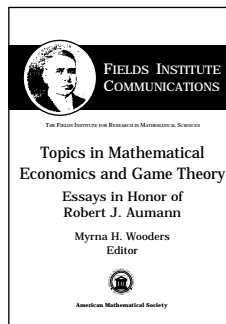
SMF members are entitled to AMS member discounts.

**Contents:** Introduction; The ergodic hypothesis; The concept of entropy; Entropy in ergodic theory; The Perron-Frobenius-Ruelle theorem; Conformal repellers; Iteration of quadratic polynomials; Phase transitions; Hausdorff measures and dimension; Bibliography.

**SMF/AMS Texts and Monographs, Volume 2**

November 1999, 82 pages, Softcover, ISBN 0-8218-1948-8, LC 99-045968, 2000 *Mathematics Subject Classification:* 28Dxx, 30-XX, 80-XX, 82Bxx, **All AMS members \$15**, List \$19, Order code SMFAMS/2N

## Applications



## Topics in Mathematical Economics and Game Theory

Essays in Honor of Robert J. Aumann

Myrna H. Wooders, *University of Toronto, ON, Canada*, Editor

Since the publication of *Theory of Games and Economic Behavior* by von Neumann and Morgenstern, the concept of games has played an increasing role in economics. It also plays a role of growing importance in other sciences, including biology, political science, and psychology. Many scientists have made seminal advances and continue to be leaders in the field, including Harsanyi, Shapley, Shubik, and Selten. Professor Robert Aumann, in addition to his important contributions to game theory and economics, made a number of significant contributions to mathematics.

This volume provides a collection of essays in mathematical economics and game theory, including cutting-edge research on noncooperative game theory and its foundations, bargaining theory, and general equilibrium theory. Also included is a reprint of Aumann’s classic paper, “Acceptable Points in General Cooperative  $n$ -Person Games” and of the oft-cited, yet hard to find, paper by Maschler, “The Worth of a Cooperative Enterprise to Each Member”. This book illustrates the wide range of applications of mathematics to economics, game theory, and social choice.

The volume is dedicated to Professor Robert J. Aumann, Hebrew University, Jerusalem, Israel, for his contributions in mathematics and social sciences.

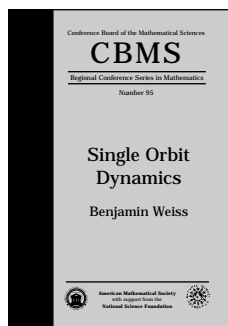
**Contents:** R. J. Aumann, Acceptable points in general cooperative  $n$ -person games; *Non-cooperative game theory:* E. J. Balder, Young measure techniques for existence of Cournot-Nash-Walras equilibria; S. J. Brams, Modeling free choice in games; *Cooperative game theory:* T. S. H. Driessen, Pairwise-bargained consistency and game theory: The case of a two-sided firm; J. E. Martínez-Legaz, A new characterization of totally balanced games; M. Maschler, The worth of a cooperative enterprise to each member; G. H. McCormick and G. Owen, Bargaining between heterogeneous organizations; R. P. McLean, Coalition structure values of mixed games; L. K. Raut, Aumann-Shapely random order values of non-atomic games; *Economics and social choice:* B. Allen, On the existence of core allocations in a large economy with incentive-compatibility constraints; B. Chakravorti, J. P. Conley, and B. Taub, Economic applications of probabilistic cheap talk; P. J. Hammond, Multilaterally strategy-proof mechanisms in random Aumann-Hildenbrand macroeconomies; F. H. Page, Jr. and M. H. Wooders, Arbitrage with price-dependent preferences: Equilibrium and market stability; N. Schofield, A smooth social choice method of preference aggregation; M. Shubik and M. H. Wooders, Clubs, near markets and market games;

A. H. Turunen-Red and A. D. Woodland, On economic applications of the Kuhn-Fourier theorem; J. Wako, Coalition-proofness of the competitive allocations in an indivisible goods market; Appendix.

Fields Institute Communications, Volume 23

December 1999, 291 pages, Hardcover, ISBN 0-8218-0525-8, LC 99-046513, 2000 *Mathematics Subject Classification*: 91Axx, 91Bxx, **Individual member \$51**, List \$85, Institutional member \$68, Order code FIC/23N

## Differential Equations



### Single Orbit Dynamics

Benjamin Weiss, *Hebrew University of Jerusalem, Israel*

This book presents the expanded notes from ten lectures given by the author at the NSF/CBMS conference held at California State University (Bakersfield). The author describes what he calls *single orbit dynamics*, which is an approach to the analysis

of dynamical systems via the study of single orbits, rather than the study of a system as a whole. He presents single orbit interpretations of several areas of topological dynamics, shedding new light on spaces of meromorphic functions, properties of dynamical systems with infinitely many degrees of freedom, etc.

In the concluding lectures, single orbit approaches to generalizations of the Shannon-Breiman-McMillan theorem and related problems of compression and universal coding are presented. Complete proofs and illuminating discussions are included and references for further study are given. Some of the material appears here for the first time in print.

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

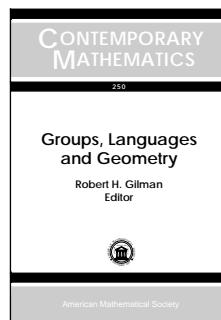
**Contents:** What is single orbit dynamics; Topological dynamics; Invariant measures, ergodicity and unique ergodicity; Ergodic and uniquely ergodic orbits; Translation invariant graphs and recurrence; Patterns in large sets; Entropy and disjointness; What is randomness?; Recurrence rates and entropy; Universal schemes.

**CBMS Regional Conference Series in Mathematics**, Number 95

January 2000, approximately 120 pages, Softcover, ISBN 0-8218-0414-6, LC 99-050183, 2000 *Mathematics Subject Classification*: 22D40, 28Dxx, 60Gxx, **All AMS members \$16**, List \$20, Order code CBMS/95N

Independent Study

## Discrete Mathematics and Combinatorics



### Groups, Languages and Geometry

Robert H. Gilman, *Stevens Institute of Technology, Hoboken, NJ*, Editor

This volume contains the proceedings of the AMS-IMS-SIAM Joint Summer Research Conference on Geometric Group Theory and Computer Science held at Mount Holyoke College (South Hadley, MA). The conference was

devoted to computational aspects of geometric group theory, a relatively young area of research which has grown out of an influx of ideas from topology and computer science into combinatorial group theory.

The book reflects recent progress in this interesting new field. Included are articles about insights from computer experiments, applications of formal language theory, decision problems, and complexity problems. There is also a survey of open questions in combinatorial group theory. The volume will interest group theorists, topologists, and experts in automata and language theory.

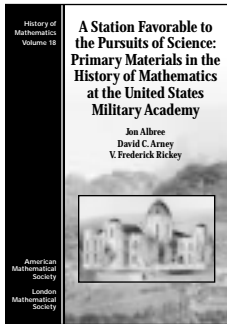
This item will also be of interest to those working in algebra and algebraic geometry.

**Contents:** G. Baumslag, A. G. Myasnikov, and V. Shpilrain, Open problems in combinatorial group theory; D. Beauquier, D. E. Muller, and P. E. Schupp, The bar problem—A simple tiling problem which is NP-complete on the Euclidean tessellation by squares but which is polynomial time on the hyperbolic tessellations by  $4g$ -gons,  $g \geq 2$ ; D. L. Boutin, When are centralizers of finite subgroups of  $Out(F_n)$  finite?; Z. Grunschlag, Computing angles in hyperbolic groups; O. Ly, On effective decidability of the homeomorphism problem for non-compact surfaces; C. F. Miller III and P. E. Schupp, Some presentations of the trivial group; S. Rees, A language theoretic analysis of combings.

**Contemporary Mathematics**, Volume 250

December 1999, 142 pages, Softcover, ISBN 0-8218-1053-7, LC 99-049968, 2000 *Mathematics Subject Classification*: 20-XX; 20F65, 68Q45, 52C20, 57M99, **Individual member \$21**, List \$35, Institutional member \$28, Order code CONM/250N

## General and Interdisciplinary



### A Station Favorable to the Pursuits of Science: Primary Materials in the History of Mathematics at the United States Military Academy

Joe Albee, *Auburn University at Montgomery, AL*, and David C. Arney and V. Frederick Rickey, *United States Military Academy, West Point, NY*

This book reveals the rich collection of mathematical works located at the nation's first military school, the U.S. Military Academy at West Point. It outlines the relevant history of the Academy, discusses the mathematics department and curriculum, and describes the development of the library during the nineteenth century. A major part of this book is an annotated catalog of the more than 1300 works published between 1496 and 1915 found in the West Point library.

Mathematics and its instruction greatly influenced the development of the Academy, the technological growth of America's army, and the standards of the military profession. These events, in turn, were crucial to the overall development of mathematics, mechanics, and engineering during the nineteenth century in the United States. Three individuals played a prominent role in this chronicle: Sylvanus Thayer, Charles Davies, and Albert Church.

Listed are rare and historically valuable works in a broad range of mathematical subjects. The collection clearly shows the strong European influence on the early Academy. Also listed are numerous textbooks by West Point faculty and graduates; significant contributions were made by these writers to algebra, geometry, calculus, descriptive geometry, mechanics, surveying, and mathematics education.

This book provides an important resource for the general audience as well as for those in pursuit of more scholarly information. It contains many interesting photographs and valuable details about the West Point collection. It is a must-have for anyone interested in mathematical books and collections.

Co-published 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.

**Contents:** Introduction; Catalog of the West Point collection; Catalog of 1803 Inventory of books, maps and charts, belonging to the Military Academy at West Point; Photographs; Portraits in the collection; Frontispieces in the collection.

**History of Mathematics, Volume 18**

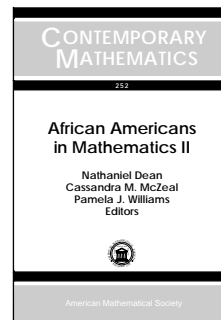
January 2000, 272 pages, Hardcover, ISBN 0-8218-2059-1, 2000 *Mathematics Subject Classification:* 01A70; 01A74, 01A90, 00A15, **Individual member \$35**, List \$59, Institutional member \$47, Order code HMATH/18N

## Mathematics: Frontiers and Perspectives

Vladimir Arnold, *University of Paris IX, France*, and *Steklov Mathematical Institute, Moscow, Russia*, Michael Atiyah, *University of Edinburgh, Scotland, UK*, Peter Lax, *New York University-Courant Institute, NY*, and Barry Mazur, *Harvard University, Cambridge, MA*, Editors

See page 1437 for a full description of this volume.

February 2000, approximately 433 pages, Hardcover, ISBN 0-8218-2070-2, LC 99-047980, 2000 *Mathematics Subject Classification:* 00B10; 00B15, **All AMS members \$39**, List \$49, Order code MFPPN



### African Americans in Mathematics II

Nathaniel Dean and Cassandra M. McZeal, *Rice University, Houston, TX*, and Pamela J. Williams, *Sandia Laboratories, Livermore, CA*, Editors

This volume presents the proceedings of the Fourth Conference for African-American Researchers in the Mathematical Sciences held at the Center for Research on Parallel Computation at Rice University (Houston). The included talks and poster presentations offer a broad perspective to the critical issues involving minority participation in mathematics. The issues explored are relevant not only to African American researchers, but also to the mathematical community in general.

This volume is the second published by the AMS (see DIMACS series, volume 15) presenting expository and research papers by distinguished African American mathematicians. In addition to filling the existing gap on African American contributions to mathematics, this book provides leadership direction and role models for students.

**Contents:** *Research talks:* E. A. Terry, Finite sums and products in Ramsey theory; P. J. Williams, A. S. El-Bakry, and R. A. Tapia, Computing an exact solution in interior-point methods for linear programming; R. Moten, Just the facts, Jack: Truths and myths of automated theorem provers; J. E. Brown, On the Sendov conjecture for polynomials with real critical points; L. Billings, J. H. Curry, and V. Robins, Chaos in relaxed Newton's method: The quadratic case; G. M. N'guerekata, Almost automorphic functions and applications to abstract evolution equations; A. Fautleroy, Moduli of complete intersections in weighted projective spaces; D. R. King, Asymptotic behavior of characters of representations of semi-simple Lie groups; *Poster presentations:* A. Nkwanta and N. Knox, A note on Riordan matrices; K. Weems, Robustness of parameter estimates in misspecified generalized linear mixed models; *Historical articles:* R. Tapia, Contemporary national mathematics education issues and the civic mathematician; J. L. Houston, A brief history of the

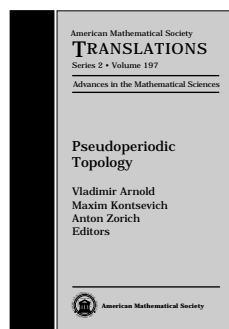


National Association of Mathematicians, Inc.; **S. W. Williams**, Black research mathematicians in the United States.

**Contemporary Mathematics**, Volume 252

January 2000, 168 pages, Softcover, ISBN 0-8218-1195-9, 2000 *Mathematics Subject Classification*: 00B15; 00B25, 01A80, **Individual member \$21**, List \$35, Institutional member \$28, Order code CONM/252N

## Geometry and Topology



### Pseudoperiodic Topology

**Vladimir Arnold**, *University of Paris IX, France*,  
**Maxim Kontsevich**, *IHES, Bures-sur-Yvette, France*, and  
**Anton Zorich**, *University of Rennes I, France*, Editors

This volume offers an account of the present state of the art in pseudoperi-

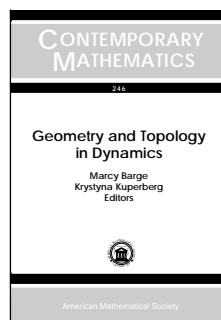
odic topology—a young branch of mathematics, born at the boundary between the ergodic theory of dynamical systems, topology, and number theory. Related topics include the theory of algorithms, convex integer polyhedra, Morse inequalities, real algebraic geometry, statistical physics, and algebraic number theory. The book contains many new results. Most of the articles contain brief surveys on the topics, making the volume accessible to a broad audience.

**From the Preface by V.I. Arnold:** “The authors ... have done much to show how modern mathematics begets, from this sea of pathological counterexamples, remarkable general and universal laws, whose discovery would be unthinkable and whose formulation would be impossible in the naive set-theoretical setting.”

**Contents:** **S. M. Gusein-Zade**, On the topology of quasiperiodic functions; **M. L. Kontsevich** and **Yu. M. Suhov**, Statistics of Klein polyhedra and multidimensional continued fractions; **A. Pajitnov**,  $C^0$ -generic properties of boundary operators in the Novikov complex; **D. A. Panov**, Pseudoperiodic mappings; **A. Zorich**, How do the leaves of a closed 1-form wind around a surface?.

**American Mathematical Society Translations—Series 2** (*Advances in the Mathematical Sciences*), Volume 197

January 2000, 178 pages, Hardcover, ISBN 0-8218-2094-X, LC 91-640741, 2000 *Mathematics Subject Classification*: 57Rxx, 58Exx, 37Axx, 37Cxx, **Individual member \$51**, List \$85, Institutional member \$68, Order code TRANS2/197N



### Geometry and Topology in Dynamics

**Marcy Barge**, *Montana State University, Bozeman*, and  
**Krystyna Kuperberg**, *Auburn University, AL*, Editors

This volume consists of the written presentations of lectures given at two special sessions: the AMS Special

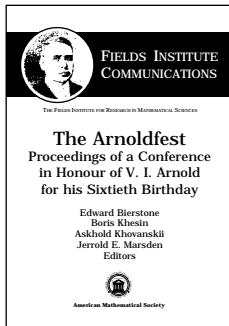
Session on Topology in Dynamics (Winston-Salem, NC) and the AMS-AWM Special Session on Geometry in Dynamics (San Antonio, TX). Each article concerns aspects of the topology or geometry of dynamical systems. Topics covered include the following: foliations and laminations, iterated function systems, the three-body problem, isotopy stability, homoclinic tangles, fractal dimension, Morse homology, knotted orbits, inverse limits, contact structures, Grassmannians, blowups, and continua.

New results are presented reflecting current trends in topological aspects of dynamical systems. The book offers a wide variety of topics of special interest to those working this area bridging topology and dynamical systems.

**Contents:** **M. Barge**, **J. Jacklitch**, and **G. Vago**, Homeomorphisms of one-dimensional inverse limits with applications to substitution tilings, unstable manifolds, and tent maps; **P. Boyland**, Isotopy stability of dynamics on surfaces; **H. Bruin**, Homeomorphic restrictions of unimodal maps; **A. Clark**, Flows on solenoids are generically not almost periodic; **P. Collins**, Dynamics forced by surface trellises; **P. Duvall** and **J. Keesling**, The Hausdorff dimension of the boundary of the Lévy dragon; **J. B. Etnyre** and **R. W. Ghrist**, Stratified integrals and unknots in inviscid flows; **V. L. Ginzburg** and **E. Kerman**, Periodic orbits in magnetic fields in dimensions greater than two; **P. Hanus** and **M. Urbański**, A new class of positive recurrent functions; **A. Illanes**, **S. Macías**, and **S. B. Nadler, Jr.**, Symmetric products and  $Q$ -manifolds; **S. R. Kaplan**, Symbolic dynamics of the collinear three-body problem; **A. Kasman**, Grassmannians, nonlinear wave equations and generalized Schur functions; **J. E. Keesling** and **C. Krishnamurthi**, The similarity boundary of a self-similar set; **P. Minc**, Homotopy classes of maps between Knaster continua; **M. Schwarz**, Equivalences for Morse homology; **C. R. Seauquist**, More monotone open homogeneous locally connected plane continua; **C. W. Stark**, Blowup and fixed points.

**Contemporary Mathematics**, Volume 246

December 1999, 250 pages, Softcover, ISBN 0-8218-1958-5, LC 99-048007, 2000 *Mathematics Subject Classification*: 58-XX; 54-XX, 55-XX, **Individual member \$35**, List \$59, Institutional member \$47, Order code CONM/246N



## The Arnoldfest Proceedings of a Conference in Honour of V. I. Arnold for his Sixtieth Birthday

**Edward Bierstone, Boris Khesin, and Askold Khovanskii, University of Toronto, ON, Canada, and Jerrold E. Marsden, California**

*Institute of Technology, Pasadena, CA, Editors*

This volume presents articles originating from invited talks at an exciting international conference held at The Fields Institute in Toronto celebrating the sixtieth birthday of the renowned mathematician, Vladimir Arnold. Experts from the world over—including several from “Arnold’s school”—gave illuminating talks and lively poster sessions. The presentations focussed on Arnold’s main areas of interest: singularity theory, the theory of curves, symmetry groups, dynamical systems, mechanics, and related areas of mathematics.

The book begins with notes of three lectures by V. Arnold given in the framework of the Institute’s Distinguished Lecturer program. The topics of the lectures are:

- From Hilbert’s Superposition Problem to Dynamical Systems
- Symplectization, Complexification, and Mathematical Trinities
- Topological Problems in Wave Propagation Theory and Topological Economy Principle in Algebraic Geometry

Arnold’s three articles include insightful comments on Russian and Western mathematics and science. Complementing the first is Jurgen Moser’s “Recollections”, concerning some of the history of KAM theory.

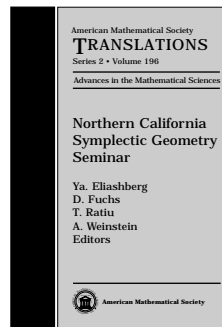
This item will also be of interest to those working in differential equations.

**Contents:** **V. I. Arnold**, From Hilbert’s superposition problem to dynamical systems; **J. Moser**, Recollections; **V. I. Arnold**, Symplectization, complexification and mathematical trinitities; **V. I. Arnold**, Topological problems in wave propagation theory and topological economy principle in algebraic geometry; **M. S. Alber, G. G. Luther, J. E. Marsden, and J. M. Robbins**, Geometry and control of three-wave interactions; **E. Bierstone** and **P. D. Milman**, Standard basis along a Samuel stratum, and implicit differentiation; **J. Damon**, A global weighted version of Bezout’s theorem; **A. Degtyarev** and **V. Kharlamov**, Real Enriques surfaces without real points and Enriques-Einstein-Hitchin 4-manifolds; **W. Ebeling** and **S. M. Gusein-Zade**, On the index of a vector field at an isolated singularity; **D. G. Ebin** and **G. Misiolek**, The exponential map on  $\mathcal{D}_\mu^2$ ; **M. H. Freedman**, Zeldovich’s neutron star and the prediction of magnetic froth; **K. Fukaya** and **K. Ono**, Arnold conjecture and Gromov-Witten invariant for general symplectic manifolds; **A. Gabrielov**, Multiplicity of a zero of an analytic function on a trajectory of a vector field; **A. B. Givental**, Singularity theory and symplectic topology; **V. V. Goryunov** and **S. K. Lando**, On enumeration of meromorphic functions on the line; **H. Hofer** and **E. Zehnder**, Pseudoholomorphic curves and dynamics; **Yu. S. Ilyashenko** and **V. Yu. Kaloshin**, Bifurcation of planar and spatial polycycles: Arnold’s program and its development; **V. M. Kharlamov**, **S. Yu. Orevkov**, and **E. I. Shustin**, Singularity which has no  $M$ -smoothing; **B. Khesin** and **A. Rosly**, Symplectic geometry on moduli spaces of holomorphic bundles over complex surfaces;

**A. Khovanskii**, Newton polyhedra, a new formula for mixed volume, product of roots of a system of equations; **W. F. Langford** and **K. Zhan**, Interactions of Andronov-Hopf and Bogdanov-Takens bifurcations; **E. Mukhin** and **A. Varchenko**, Solutions of the qKZB equation in tensor products of finite dimensional modules over the elliptic quantum group  $E_{\tau, \eta} sl_2$ ; **S. P. Novikov**, Schrodinger operators on graphs and symplectic geometry; **M. Rudnev** and **S. Wiggins**, On the dominant Fourier modes in the series associated with separatrix splitting for an a-priori stable, three degree-of-freedom Hamiltonian system; **V. A. Vassiliev**, Homology of  $i$ -connected graphs and invariants of knots, plane arrangements, etc.; **V. A. Vladimirov** and **K. I. Ilin**, On Arnold’s variational principles in fluid mechanics; **S. Yakovenko**, On functions and curves defined by ordinary differential equations; **Y. Yomdin**, Global finiteness properties of analytic families and algebra of their Taylor coefficients.

**Fields Institute Communications, Volume 24**

January 2000, 555 pages, Hardcover, ISBN 0-8218-0945-8, LC 99-045778, 1991 *Mathematics Subject Classification*: 01A65, 14-06, 34-06, 57-06, 58-06, 76-06, 70-06, **Individual member \$60**, List \$100, Institutional member \$80, Order code FIC/24N



## Northern California Symplectic Geometry Seminar

**Ya. Eliashberg, Stanford University, CA, D. Fuchs, University of California, Davis, T. Ratiu, Ecole Polytechnique Federale de Lausanne, Switzerland, and A. Weinstein, University of California, Berkeley, Editors**

This seminar was established to encourage ongoing interaction between geometers at Stanford University and the University of California (Berkeley, Davis, and Santa Cruz). Over the years, lectures presented have provided a panorama of developments in symplectic and contact geometry and topology, Poisson geometry, quantization theory, and applications.

This volume includes papers by several of the seminar participants. The diversity of the topics from the seminar are reflected in the informative presentations. A wide range of topics are presented in the book, including symplectic topology, Hamiltonian dynamics, quantum cohomology and mirror symmetry, infinite-dimensional symplectic geometry, the theory of Hamiltonian group actions, and quantization.

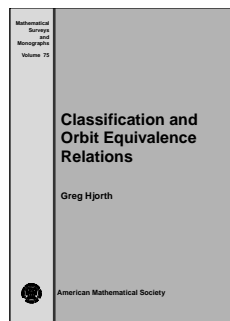
**Contents:** **A. Cannas da Silva** and **V. Guillemin**, Quantization of symplectic orbifolds and group actions; **S. K. Donaldson**, Symmetric spaces, Kahler geometry and Hamiltonian dynamics; **V. L. Ginzburg**, Hamiltonian dynamical systems without periodic orbits; **A. Givental**, The mirror formula for quintic threefolds; **F. Lalonde** and **C. Pestieau**, Stabilisation of symplectic inequalities and applications; **D. McDuff**, The virtual moduli cycle; **R. Montgomery**, Engel deformations and contact structures; **M. Poźniak**, Floer homology, Novikov rings and clean intersections; **Y. Ruan**, Surgery, quantum cohomology and birational geometry; **D. A. Salamon**, Quantum products for mapping tori and the Atiyah-Floer conjecture; **P. Seidel**, On the group of symplectic automorphisms of

$CP^m \times CP^n$ ; S. Tolman and J. Weitsman, On the cohomology rings of Hamiltonian  $T$ -spaces.

**American Mathematical Society Translations—Series 2**  
(*Advances in the Mathematical Sciences*), Volume 196

December 1999, 258 pages, Hardcover, ISBN 0-8218-2075-3, LC 91-640741, 2000 *Mathematics Subject Classification*: 53Dxx, 58Dxx, 58Jxx, **Individual member \$57**, List \$95, Institutional member \$76, Order code TRANS2/196N

## Logic and Foundations



### Classification and Orbit Equivalence Relations

Greg Hjorth, *University of California, Los Angeles*

Actions of Polish groups are ubiquitous in mathematics. In certain branches of ergodic theory and functional analysis, one finds a systematic study of the group of measure-

preserving transformations and the unitary group. In logic, the analysis of countable models intertwines with results concerning the actions of the infinite symmetric group.

This text develops the theory of Polish group actions entirely from scratch, ultimately presenting a coherent theory of the resulting orbit equivalence classes that may allow complete classification by invariants of an indicated form. The book concludes with a criterion for an orbit equivalence relation classifiable by countable structures considered up to isomorphism.

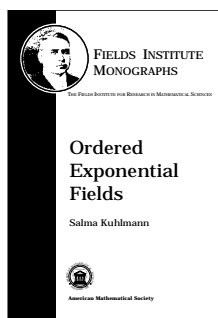
This self-contained volume offers a complete treatment of this active area of current research and develops a difficult general theory classifying a class of mathematical objects up to some relevant notion of isomorphism or equivalence.

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

**Contents:** An outline; Definitions and technicalities; Turbulence; Classifying homeomorphisms; Infinite dimensional group representations; A generalized Scott analysis; GE groups; The dark side; Beyond Borel; Looking ahead; Ordinals; Notation; Bibliography; Index.

**Mathematical Surveys and Monographs**, Volume 75

December 1999, 195 pages, Hardcover, ISBN 0-8218-2002-8, LC 99-046365, 2000 *Mathematics Subject Classification*: 03E15; 22A05, 54H05, 54H20, **Individual member \$33**, List \$55, Institutional member \$44, Order code SURV/75N



### Ordered Exponential Fields

Salma Kuhlmann, *University of Saskatchewan, Saskatoon, Canada*

Model theoretic algebra has witnessed remarkable progress in the last few years. It has found profound applications in other areas of mathematics, notably in algebraic geometry and in singularity theory.

Since Wilkie's results on the o-minimality of the expansion of the reals by the exponential function, and most recently even by all Pfaffian functions, the study of o-minimal expansions of the reals has become a fascinating topic. The quest for analogies between the semi-algebraic case and the o-minimal case has set a direction to this research.

Through the Artin-Schreier Theory of real closed fields, the structure of the non-archimedean models in the semi-algebraic case is well understood. For the o-minimal case, so far there has been no systematic study of the non-archimedean models. The goal of this monograph is to serve this purpose.

The author presents a detailed description of the non-archimedean models of the elementary theory of certain o-minimal expansions of the reals in which the exponential function is definable. The example of exponential Hardy fields is worked out with particular emphasis. The basic tool is valuation theory, and a sufficient amount of background material on orderings and valuations is presented for the convenience of the reader.

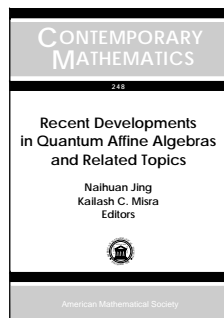
This item will also be of interest to those working in algebra and algebraic geometry.

**Contents:** Preliminaries on valued and ordered modules; Non-archimedean exponential fields; Valuation theoretic interpretation of the growth and Taylor axioms; The exponential rank; Construction of exponential fields; Models for the elementary theory of the reals with restricted analytic functions and exponentiation; Exponential Hardy fields; The model theory of contraction groups; Bibliography; Index; List of notation.

**Fields Institute Monographs**, Volume 12

January 2000, 166 pages, Hardcover, ISBN 0-8218-0943-1, LC 99-049502, 2000 *Mathematics Subject Classification*: 03C60; 12J15, 12L12, 26A12, **Individual member \$30**, List \$50, Institutional member \$40, Order code FIM/12N

# Mathematical Physics



## Recent Developments in Quantum Affine Algebras and Related Topics

Naihuan Jing and Kailash C. Misra, *North Carolina State University, Raleigh*, Editors

This volume reflects the proceedings of the International Conference on Representations of Affine and Quantum Affine Algebras and Their Applications held at North Carolina State University (Raleigh). In recent years, the theory of affine and quantum affine Lie algebras has become an important area of mathematical research with numerous applications in other areas of mathematics and physics.

Three areas of recent progress are the focus of this volume: affine and quantum affine algebras and their generalizations, vertex operator algebras and their representations, and applications in combinatorics and statistical mechanics. Talks given by leading international experts at the conference offered both overviews on the subjects and current research results. The book nicely presents the interplay of these topics recently occupying "center stage" in the theory of infinite dimensional Lie theory.

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

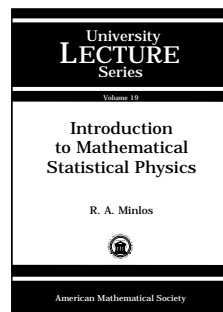
**Contents:** G. Benkart, S.-J. Kang, H. Lee, and D.-U. Shin, The polynomial behavior of weight multiplicities for classical simple Lie algebras and classical affine Kac-Moody algebras; S. Berman and S. Tan, A note on embeddings of some Lie algebras defined by matrices; S. Berman and J. Szmigielski, Principal realization for the extended affine Lie algebra of type  $sl_2$  with coordinates in a simple quantum torus with two generators; V. Chari and N. Xi, Monomial bases of quantized enveloping algebras; J. Ding and B. Feigin, Quantized W-algebra of  $sl(2, 1)$ : a construction from the quantization of screening operators; L. Dolan, Affine algebras and non-perturbative symmetries in superstring theory; C. Dong and K. Nagatomo, Automorphism groups and twisted modules for lattice vertex operator algebras; P. Di Francesco, Truncated meanders; E. Frenkel and N. Reshetikhin, The  $q$ -characters of representations of quantum affine algebras and deformations of  $\mathcal{W}$ -algebras; O. Foda and T. A. Welsh, Melzer's identities revisited; R. L. Griess, Jr., Automorphisms of lattice type vertex operator algebras and variations, a survey; G. Hatayama, A. Kuniba, M. Okado, T. Takagi, and Y. Yamada, Remarks on fermionic formula; N. Jing and K. C. Misra,  $q$ -vertex operators for quantum affine algebras; S. Kumar, Homology of certain truncated Lie algebras; J. Lepowsky, Vertex operator algebras and the zeta function; H. Li and S. Wang, On  $\mathbb{Z}$ -graded associative algebras and their  $\mathbb{N}$ -graded modules; D. J. Melville, An  $\mathbb{A}$ -form technique of quantum deformations; T. Miwa and Y. Takeyama, Determinant formula for the solutions of the quantum Knizhnik-Zamolodchikov

equation with  $|q| = 1$ ; E. Mukhin and A. Varchenko, Functorial properties of the hypergeometric map; T. Nakashima, Polyhedral realizations of crystal bases and braid-type isomorphisms; Y. Soibelman, Meromorphic tensor categories, quantum affine and chiral algebras I; W. Wang, Dual pairs and infinite dimensional Lie algebras.

Contemporary Mathematics, Volume 248

January 2000, 469 pages, Softcover, ISBN 0-8218-1199-1, 2000 *Mathematics Subject Classification*: 17B37; 17B69, 05E05, 17B67, 17B99, 05E15, 05E99, **Individual member \$57**, List \$95, Institutional member \$76, Order code CONM/248N

### Supplementary Reading



## Introduction to Mathematical Statistical Physics

R. A. Minlos, *Institute for Problems of Information Transmission, Moscow, Russia*

This book presents a mathematically rigorous approach to the main ideas and phenomena of statistical physics. The introduction addresses the phys-

ical motivation, focussing on the basic concept of modern statistical physics, that is the notion of Gibbsian random fields.

Properties of Gibbsian fields are analyzed in two ranges of physical parameters: "regular" (corresponding to high-temperature and low-density regimes) where no phase transition is exhibited, and "singular" (low temperature regimes) where such transitions occur.

Next, a detailed approach to the analysis of the phenomena of phase transitions of the first kind, the Pirogov-Sinai theory, is presented. The author discusses this theory in a general way and illustrates it with the example of a lattice gas with three types of particles. The conclusion gives a brief review of recent developments arising from this theory.

The volume is written for the beginner, yet advanced students will benefit from it as well. The book will serve nicely as a supplementary textbook for course study. The prerequisites are an elementary knowledge of mechanics, probability theory and functional analysis.

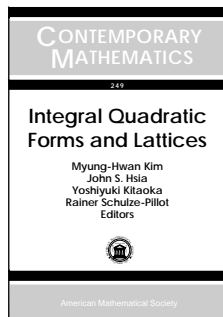
**Contents:** *The subject and the main notions of equilibrium statistical physics:* Typical systems of statistical physics (Phase space, dynamics, microcanonical measure); Statistical ensembles (Microcanonical and canonical ensembles, equivalence of ensembles); Statistical ensembles-Continuation (the system of indistinguishable particles and the grand canonical ensemble); The thermodynamic limit and the limit Gibbs distribution; *The existence and some ergodic properties of limiting Gibbs distributions for nonsingular values of parameters:* The correlation functions and the correlation equations; Existence of the limit correlation function (for large positive  $\mu$  or small  $\beta$ ); Decrease of correlations for the limit Gibbs distribution and some corollaries (Representativity of mean values, distribution of fluctuations, ergodicity); Thermodynamic functions; *Phase transitions:* Gibbs distributions with boundary configurations; An example of nonuniqueness of Gibbs distributions; Phase

transitions in more complicated models; The ensemble of contours (Pirogov-Sinai theory); Deviation: The ensemble of geometric configurations of contours; The Pirogov-Sinai equations (Completion of the proof of the main theorem); Epilogue. What is next?; Bibliography; Index.

University Lecture Series, Volume 19

December 1999, 103 pages, Softcover, ISBN 0-8218-1337-4, LC 99-049593, 2000 *Mathematics Subject Classification*: 82-01; 82B05, All AMS members \$19, List \$24, Order code ULECT/19N

## Number Theory



### Integral Quadratic Forms and Lattices

Myung-Hwan Kim, *Seoul National University, Korea*,  
John S. Hsia, *Ohio State University, Columbus*,  
Yoshiyuki Kitaoka, *Nagoya University, Japan*, and Rainer Schulze-Pillot, *Universität des Saarlandes, Saarbrücken, Germany*, Editors

This volume presents the proceedings of an international conference held at Seoul National University (Korea). Talks covered recent developments in diverse areas related to the theory of integral quadratic forms and hermitian forms, local densities, linear relations and congruences of theta series, zeta functions of prehomogeneous vector spaces, lattices with maximal finite matrix groups, globally irreducible lattices, Mordell-Weil lattices, and more.

Articles in the volume represent expository lectures by leading experts on recent developments in the field. The book offers a comprehensive introduction to the current state of knowledge in the arithmetic theory of quadratic forms and provides active directions of research with new results. Topics addressed in the volume emphasize connections with related fields, such as group theory, arithmetic geometry, analytic number theory, and modular forms. The book is an excellent introductory guide for students as well as a rich reference source for researchers.

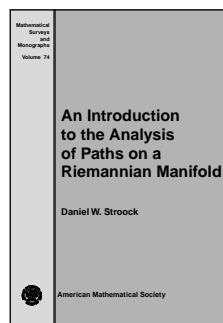
**Contents:** J. S. Hsia, Arithmetic of indefinite quadratic forms; A. G. Earnest, Universal and regular positive quadratic lattices over totally real number fields; W. K. Chan, Class numbers of quaternary quadratic forms of discriminant  $4p$ ; A. Khosravani, Universal quadratic and Hermitian forms; B. M. Kim, M.-H. Kim, and B.-K. Oh, 2-universal positive definite integral quinary quadratic forms; Y. Kitaoka, Finite arithmetic subgroups of  $GL_n$ , VI; M. Jöchner, On the representation theory of positive definite quadratic forms; T. Shioda, Cyclotomic analogue in the theory of algebraic equations of type  $E_6, E_7, E_8$ ; P. H. Tiep, Globally irreducible lattices; B. H. Gross, On simply-connected groups over  $\mathbb{Z}$ , with  $G(\mathbb{R})$  compact; P. Calame and M. Mischler,  $F$ -lattices and genus of hermitian forms; D. G. James, Primitive local densities for unimodular quadratic forms; Y. Hironaka, Local densities of hermitian forms; D. R. Estes and K. Moon, Form class groups over number fields; F. Xu, Arithmetic Springer theorem on quadratic forms under field extensions of odd degree; A.-M. Bergé, Classification of positive forms

having prescribed automorphisms; G. Nebe, Construction and investigation of lattices with matrix groups; R. Scharlau, A. Schiemann, and R. Schulze-Pillot, Theta series of modular, extremal, and hermitian lattices; H. Katsurada, Squared Möbius function for half-integral matrices; N. Dummigan, Theta series congruences; M. Hisasue, On a denominator of a certain formal power series attached to local densities; K.-i. Hashimoto, Linear relations of theta series attached to Eichler orders of quaternion algebras.

Contemporary Mathematics, Volume 249

December 1999, approximately 299 pages, Softcover, ISBN 0-8218-1949-6, LC 99-046243, 2000 *Mathematics Subject Classification*: 11E12, 11E20, 11E39, 11E41, 11E45; 11F27, 11F30, 11F33, 11H56, 20C10, Individual member \$57, List \$95, Institutional member \$76, Order code CONM/249N

## Probability



### An Introduction to the Analysis of Paths on a Riemannian Manifold

Daniel W. Stroock,  
*Massachusetts Institute of Technology, Cambridge*

This book aims to bridge the gap between probability and differential geometry. It gives two constructions of Brownian motion on a Riemannian manifold: an extrinsic one where the manifold is realized as an embedded submanifold of Euclidean space and an intrinsic one based on the "rolling" map. It is then shown how geometric quantities (such as curvature) are reflected by the behavior of Brownian paths and how that behavior can be used to extract information about geometric quantities. Readers should have a strong background in analysis with basic knowledge in stochastic calculus and differential geometry.

Professor Stroock is a highly-respected expert in probability and analysis. The clarity and style of his exposition further enhance the quality of this volume. Readers will find an inviting introduction to the study of paths and Brownian motion on Riemannian manifolds.

**Contents:** Brownian motion in Euclidean space; Diffusions in Euclidean space; Some addenda, extensions, and refinements; Doing it on a manifold, an extrinsic approach; More about extrinsic Riemannian geometry; Bochner's identity; Some intrinsic Riemannian geometry; The bundle of orthonormal frames; Local analysis of Brownian motion; Perturbing Brownian paths; References; Index.

Mathematical Surveys and Monographs, Volume 74

December 1999, 269 pages, Hardcover, ISBN 0-8218-2020-6, LC 99-044329, 2000 *Mathematics Subject Classification*: 60J65; 60J60, 60D05, Individual member \$24, List \$40, Institutional member \$32, Order code SURV/74N

# Previously Announced Publications

## External Memory Algorithms

**James M. Abello**, *AT&T Labs–Research, Florham Park, NJ*, and **Jeffrey Scott Vitter**, *Duke University, Durham, NC*, Editors

We are especially proud to announce the publication of this DIMACS book—the 50th volume in this series, published by the AMS. The series was established out of a collaborative venture geared to unite the cutting-edge research at DIMACS with the resources at the AMS to produce useful, well-designed, important mathematical and computational sciences works. This volume is a hallmark in this firmly grounded and well-received AMS series.

The AMS’s 50th DIMACS volume is also particularly notable at this time: The year 1999 marks the 10th anniversary of the founding of DIMACS as a center. Participants in the DIMACS national research project are Rutgers University, Princeton University, AT&T Labs–Research, Bell Labs, Telcordia Technologies and NEC Research Institute.

The success of the joint publishing venture between the AMS and DIMACS is excellent. We continue to work concordantly with the Center to further their goal of playing a key national leadership role in the development, application, and dissemination of discrete mathematics and theoretical computer science. This 50th DIMACS volume is in celebration of that dynamic, ongoing partnership.

### *About the book:*

Special techniques from computer science and mathematics are used to solve combinatorial problems whose associated data require a hierarchy of storage devices. These solutions employ “extended memory algorithms”. The input/output (I/O) communication between the levels of the hierarchy is often a significant bottleneck, especially in applications that process massive amounts of data. Gains in performance are possible by incorporating locality directly into the algorithms and managing the contents of each storage level.

The relative difference in data access speeds is more apparent between random access memory and magnetic disks. Therefore, much research has been devoted to algorithms that focus on this I/O bottleneck. These algorithms are usually called “external memory”, “out-of-core”, or “I/O algorithms”.

This volume presents new research results and current techniques for the design and analysis of external memory algorithms. The articles grew out of the workshop, “External Memory Algorithms and Visualization” held at DIMACS. Leading researchers were invited to give lectures and to contribute their work. Topics presented include problems in computational geometry, graph theory, data compression, disk scheduling, linear algebra, statistics, software libraries, text and string processing, visualization, wavelets, and industrial applications.

The vitality of the research and the interdisciplinary nature of the event produced fruitful ground for the compelling fusion of ideas and methods. This volume comprises the rich results that grew out of that process.

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

**Contributors include:** J. S. Vitter, P. B. Gibbons, Y. Matias, I. Al-Furaih, T. Johnson, S. Ranka, R. Grossi, G. F. Italiano, M. R. Henzinger, P. Raghavan, S. Rajagopalan, J. Abello, P. M. Pardalos, M. G. C. Resende, A. Crauser, P. Ferragina, K. Mehlhorn, U. Meyer, E. A. Ramos, L. Arge, P. B. Miltersen, S. Toledo, K.-P. Vo, K. V. Shvachko, M. Kallahalla, P. J. Varman, S. K. Das, M. C. Pinotti, Y.-J. Chiang, C. T. Silva, S. T. Leutenegger, and K.-L. Ma.

**DIMACS: Series in Discrete Mathematics and Theoretical Computer Science**, Volume 50

December 1999, 306 pages, Hardcover, ISBN 0-8218-1184-3, 2000 *Mathematics Subject Classification*: 68–06, 68Q25, 68N05, 68P05, 68R10, 68U05, 68Y20, 65F10, 65Y20, 65Y25, 68Q10, 68Q20, 68Q22, **Individual member \$45**, List \$75, Institutional member \$60, Order code DIMACS/50RT912

**Recommended Text**

## Foliations I

**Alberto Candel**, *California Institute of Technology, Pasadena*, and **Lawrence Conlon**, *Washington University, St. Louis, MO*

This is the first of two volumes on the qualitative theory of foliations. This volume is divided into three parts. The book is extensively illustrated throughout and provides a large number of examples.

Part 1 is intended as a “primer” in foliation theory. A working knowledge of manifold theory and topology is a prerequisite. Fundamental definitions and theorems are explained to prepare the reader for further exploration of the topic. This section places considerable emphasis on the construction of examples, which are accompanied by many illustrations.

Part 2 considers foliations of codimension one. Using very hands-on geometric methods, the path leads to a complete structure theory (the theory of levels), which was established by Conlon along with Cantwell, Hector, Duminy, Nishimori, Tsuchiya, et al. Presented here is the first and only full treatment of the theory of levels in a textbook.

Part 3 is devoted to foliations of higher codimension, including abstract laminations (foliated spaces). The treatment emphasizes the methods of ergodic theory: holonomy-invariant measures and entropy. Featured are Sullivan’s theory of foliation cycles, Plante’s theory of growth of leaves, and the Ghys, Langevin, Walczak theory of geometric entropy.

This comprehensive volume has something to offer a broad spectrum of readers: from beginners to advanced students to professional researchers. Packed with a wealth of illustrations and copious examples at varying degrees of difficulty, this highly-accessible text offers the first full treatment in the literature of the theory of levels for foliated manifolds of codimension one. It would make an elegant supplementary text for a topics course at the advanced graduate level.

**Graduate Studies in Mathematics**, Volume 23

December 1999, 402 pages, Hardcover, ISBN 0-8218-0809-5, LC 99-045694, 2000 *Mathematics Subject Classification*: 57R30, **All AMS members \$43**, List \$54, Order code GSM/23RT912

## Recommended Text

**A Course in Operator Theory**

**John B. Conway**, *University of Tennessee, Knoxville*

Operator theory is a significant part of many important areas of modern mathematics: functional analysis, differential equations, index theory, representation theory, mathematical physics, and more. This text covers the central themes of operator theory, presented with the excellent clarity and style that readers have come to associate with Conway's writing.

Early chapters introduce and review material on  $C^*$ -algebras, normal operators, compact operators and non-normal operators. The topics include the spectral theorem, the functional calculus and the Fredholm index. Also, some deep connections between operator theory and analytic functions are presented.

Later chapters cover more advanced topics, such as representations of  $C^*$ -algebras, compact perturbations and von Neumann algebras. Major results, such as the Sz.-Nagy Dilation Theorem, the Weyl-von Neumann-Berg Theorem and the classification of von Neumann algebras, are covered, as is a treatment of Fredholm theory. These advanced topics are at the heart of current research.

The last chapter gives an introduction to reflexive subspaces, i.e., subspaces of operators that are determined by their invariant subspaces. These, along with hyperreflexive spaces, are one of the more successful episodes in the modern study of asymmetric algebras.

Professor Conway's authoritative treatment makes this a compelling and rigorous course text, suitable for graduate students who have had a standard course in functional analysis.

**Graduate Studies in Mathematics**, Volume 21

December 1999, 372 pages, Hardcover, ISBN 0-8218-2065-6, LC 99-41229, 2000 *Mathematics Subject Classification*: 47A99, All AMS members \$39, List \$49, Order code GSM/21RT912

## Recommended Text

**Growth of Algebras and Gelfand-Kirillov Dimension****Revised Edition**

**Günter R. Krause**, *University of Manitoba, Winnipeg, Canada*, and **Thomas H. Lenagan**, *University of Edinburgh, Scotland*

During the two decades that preceded the publication of the first edition of this book, the Gelfand-Kirillov dimension had emerged as a very useful and powerful tool for investigating non-commutative algebras. At that time, the basic ideas and results were scattered throughout various journal articles. The first edition of this book provided a much-needed reliable and coherent single source of information. Since that time, the book has become the standard reference source for researchers.

For this edition, the authors incorporated the original text with only minor modifications. Errors have been corrected, items have been rephrased, and more mathematical expressions have been displayed for the purpose of clarity.

The newly added Chapter 12 provides broad overviews of the new developments that have surfaced in the last few years, with references to the literature for details. The bibliography

has been updated and accordingly, almost double the size of the original one.

The faithful revision and contemporary design of this work offers time-honored expertise with modern functionality: A keenly appealing combination. So, whether for the classroom, the well-tended mathematical books collection, or the research desk, this book holds unprecedented relevance.

**Graduate Studies in Mathematics**, Volume 22

November 1999, 212 pages, Hardcover, ISBN 0-8218-0859-1, LC 99-39164, 2000 *Mathematics Subject Classification*: 16-XX, 17Bxx; 13Exx, 20Fxx, All AMS members \$31, List \$39, Order code GSM/22RT912

## Supplementary Reading

**Jacobi Operators and Completely Integrable Nonlinear Lattices**

**Gerald Teschl**, *Institut für Mathematik, Universität Wien, Vienna, Austria*

This volume can serve as an introduction and a reference source on spectral and inverse spectral theory of Jacobi operators (i.e., second order symmetric difference operators) and applications of those theories to the Toda and Kac-van Moerbeke hierarchy.

Beginning with second order difference equations, the author develops discrete Weyl-Titchmarsh-Kodaira theory, covering all classical aspects, such as Weyl  $m$ -functions, spectral functions, the moment problem, inverse spectral theory, and uniqueness results.

Teschl then investigates more advanced topics, such as locating the essential, absolutely continuous, and discrete spectrum, subordinacy, oscillation theory, trace formulas, random operators, almost periodic operators, (quasi-)periodic operators, scattering theory, and spectral deformations. Utilizing the Lax approach, he introduces the Toda hierarchy and its modified counterpart, the Kac-van Moerbeke hierarchy. Uniqueness and existence theorems for solutions, expressions for solutions in terms of Riemann theta functions, the inverse scattering transform, Bäcklund transformations, and soliton solutions are derived.

This text covers all basic topics of Jacobi operators and includes recent advances. It is suitable for use as a text at the advanced graduate level.

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

**Mathematical Surveys and Monographs**, Volume 72

October 1999, 372 pages, Hardcover, ISBN 0-8218-1940-2, LC 99-39165, 2000 *Mathematics Subject Classification*: 39Axx, 47B39, 58F07, All AMS members \$52, List \$65, Order code SURV/72RT912