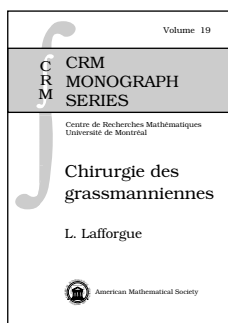


New Publications Offered by the AMS

Algebra and Algebraic Geometry



Chirurgie des grassmanniennes

L. Lafforgue, *Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France*

The AMS now makes available this succinct and quite elegant research monograph written by Fields Medalist and eminent researcher, Laurent Lafforgue. The material is an

outgrowth of Lafforgue's lectures and seminar at the Centre de Recherches Mathématiques (University of Montréal, PQ, Canada), where he held the 2001-2002 Aisenstadt Chair.

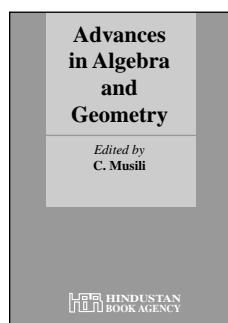
In the book, he addresses an important recurrent theme of modern mathematics: the various compactifications of moduli spaces, which have a large number of applications. This book treats the case of thin Schubert varieties, which are natural subvarieties of Grassmannians. He was led to these questions by a particular case linked to his work on the Langlands program. In this monograph, he develops the theory in a more systematic way, which exhibits strong similarities with the case of moduli of stable curves.

Prerequisites are minimal and include basic algebraic geometry, and standard facts about Grassmann varieties, their Plücker embeddings, and toric varieties. The book is suitable for advanced graduate students and research mathematicians interested in the classification of moduli spaces.

Contents: Cellules de Schubert minces et espaces de configurations de matroïdes; Compactifications: Pavages de convexes entiers et recollement des cellules de Schubert minces; Étude de quelques familles simples de compactifications; Le fibré équivariant universel sur la variété torique des facettes des pavages; Variations de variétés projectives rationnelles avec structures logarithmiques; Références bibliographiques.

CRM Monograph Series, Volume 19

April 2003, 170 pages, Hardcover, ISBN 0-8218-3358-8, LC 2003045105, 2000 *Mathematics Subject Classification*: 14N20, 52B40, 14M15, 15A75, 14M25, 14D20, **All AMS members \$36**, List \$45, Order code CRMM/19N



Advances in Algebra and Geometry

C. Musili, *University of Hyderabad, India*

This book presents 12 papers from the International Conference on Algebra and Geometry. This was the fourth annual and first international meeting of the Commutative Algebraists and Algebraic Geometers in India (CAAG). Included are surveys,

expositions, and other research presentations on algebra, algebraic geometry, noncommutative geometry, computational algebraic geometry, and related topics by leading mathematicians worldwide.

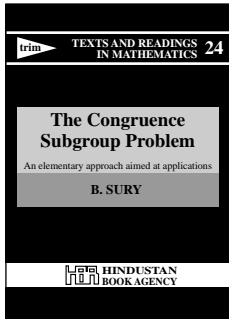
The book is intended for graduate students and researchers interested in algebra and geometry.

A publication of the Hindustan Book Agency. Distributed exclusively by the American Mathematical Society in North America and worldwide on the AMS Bookstore.

Contents: *Algebra:* A. Conca, Products of ideals with linear resolution; A. K. Dutta, Some results on affine fibrations; J. Herzog, Koszul algebras and modules; A. V. Jayanthan and J. K. Verma, Local cohomology modules of bigraded Rees algebras; M. Ojanguren and R. Parimala, Quadratic forms over complete local rings; A. Ram, Representations of rank two affine Hecke algebras; H. Srinivasan, Gorenstein sequences; V. Suresh, The u -invariant of the function fields of p -adic curves; *Geometry:* S. S. Abhyankar, Geometry and Galois theory; V. Balaji, Semistable principal bundles; S. D. Cutkosky, Ramification of valuations and singularities; F. J. Gallego and B. P. Purnaprajna, Homogeneous rings associated to finite morphisms.

Hindustan Book Agency

February 2003, 309 pages, Hardcover, ISBN 81-85931-36-4, 2000 *Mathematics Subject Classification*: 13-06, 14-06, 16-06, 17-06, 20-06, 51-06, 68-06, **All AMS members \$38**, List \$48, Order code HIN/10N



The Congruence Subgroup Problem

B. Sury, *Indian Statistical Institute, Bangalore*

This is an elementary introduction to the congruence subgroup problem, a problem that deals with number-theoretic properties of groups defined arithmetically. The novelty and, indeed, the goal of this book is to

present some applications to group theory, as well as to number theory, that have emerged in the last fifteen years.

No knowledge of algebraic groups is assumed, and the choice of the examples discussed seeks to convey that even these special cases give interesting applications.

After the background material in group theory and number theory, solvable groups are treated first, and some generalizations are presented using class field theory. Then the group $SL(n)$ over rings of S -integers is studied. The methods involved are very different from the ones employed for solvable groups. Group-theoretic properties, such as presentations and central extensions, are extensively used. Several proofs, which appeared after the original ones, are discussed.

The last chapter has a survey of the status of the congruence subgroup problem for general algebraic groups. Only outlines of proofs are given here, and with a sufficient understanding of algebraic groups, the proofs can be completed.

The book is intended for beginning graduate students. Many exercises are given.

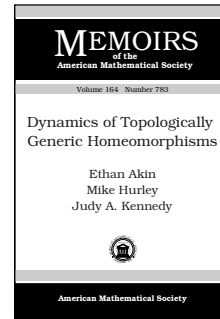
A publication of the Hindustan Book Agency. Distributed exclusively by the American Mathematical Society in North America and worldwide on the AMS Bookstore.

Contents: A review of some basic notions; Congruence subgroups in solvable groups; SL_2 —The negative solutions; $SL_n(\mathcal{O}_S)$ —The positive cases of CSP; Applications of the CSP; CSP in general algebraic groups; Appendix: Moor's local uniqueness theorem.

Hindustan Book Agency

March 2003, 301 pages, Hardcover, ISBN 81-85931-38-0, 2000 *Mathematics Subject Classification*: 11F06, 20G30, 20H05, All AMS members \$38, List \$48, Order code HIN/12N

Analysis



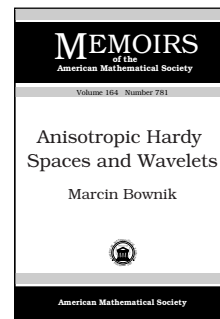
Dynamics of Topologically Generic Homeomorphisms

Ethan Akin, *City College of New York (CUNY)*,
Mike Hurley, *Case Western Reserve University, Cleveland, OH*, and
Judy A. Kennedy, *University of Delaware, Newark*

Contents: Introduction; Attractors and chain recurrence; Periodic decompositions and adding machines; Semicontinuity and homogeneity; Crushing arguments; Topological horse-shoes; Generic homeomorphisms; Almost equicontinuity; Cantor sets; The circle; Crushing the chain recurrent set; Generic homeomorphisms on manifolds; Generic mappings on manifolds; Bibliography; Index.

Memoirs of the American Mathematical Society, Volume 164, Number 783

July 2003, 130 pages, Softcover, ISBN 0-8218-3338-3, LC 2003048026, 2000 *Mathematics Subject Classification*: 37B99, Individual member \$32, List \$53, Institutional member \$42, Order code MEMO/164/783N



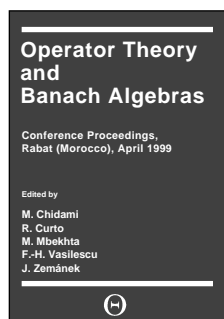
Anisotropic Hardy Spaces and Wavelets

Marcin Bownik, *University of Michigan, Ann Arbor*

Contents: Anisotropic Hardy spaces; Wavelets; Notation index; Bibliography.

Memoirs of the American Mathematical Society, Volume 164, Number 781

July 2003, 122 pages, Softcover, ISBN 0-8218-3326-X, LC 2003048023, 2000 *Mathematics Subject Classification*: 42B30, 42C40; 42B20, 42B25, Individual member \$32, List \$53, Institutional member \$42, Order code MEMO/164/781N



Operator Theory and Banach Algebras

M. Chidami, *University of Rabat, Morocco*, R. Curto, *University of Iowa, Iowa City*, M. Mbekhta, *University of Lille, France*, F.-H. Vasilescu, *University of Lille I, France*, and J. Zemánek, *Institute of Mathematics, Warsaw*, Editors

A publication of the Theta Foundation.

This volume contains the proceedings of the International Conference on Operator Theory and Banach Algebras. Over 70 participants from the world over attended. The book contains 14 selected refereed papers; three are written in English and the rest in French. Half are survey papers referring to different domains; the remaining papers contain original results with complete proofs.

The main topics covered are the spectral theory of operators on a Banach space, classes of topological algebras with applications to physics, different classes of operators on Hilbert and Banach space, problems in Banach algebras, Lie algebras of operators, interaction between complex analysis and operator theory, and semigroups of operators.

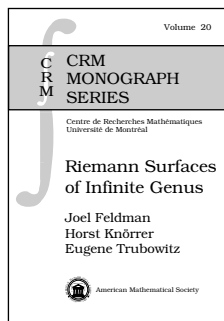
All papers have been revised to account for recent developments. Overall, they present an accurate overview of the domains considered.

A publication of the Theta Foundation. Distributed worldwide, except in Romania, by the AMS.

Contents: P. Aiena and M. Gonzalez, Improjective operators which are not inessential; M. Akkar, R. A. Hassani, and A. Blali, C -semi-groupes α -intégrés affiliés à des algèbres d'opérateurs; B. Aupetit, E. Makai, M. Mbekhta, and J. Zemánek, The connected components of the idempotents in the Calkin algebra and their liftings; F. Bagarello, Quantum models and locally convex $*$ -algebras; M. Cabrera and A. A. Mohammed, Algebra of quotients with bounded evaluation of a normed prime algebra; G. Cassier, Autour de quelques interactions récentes entre l'analyse complexe et la théorie des opérateurs; R. E. Curto and W. Y. Lee, Subnormality and k -hyponormality of Toeplitz operators: A brief survey and open questions; K. B. Laursen, (δ) decomposability; L. W. Marcoux, A survey of $(U + K)$ -orbits; A. Micali, Sur les algèbres de Banach-Bernstein; M. M. Neumann, Intertwining restrictions and quotients of decomposable operators; A. R. Sourour, The Lie structure of certain algebras of operators; C. Trapani, CQ^* -algebras of operators: Density properties; F.-H. Vasilescu, Extensions of unbounded symmetric multioperators.

International Book Series of Mathematical Texts

March 2003, 166 pages, Softcover, ISBN 973-85432-1-5, 2000 *Mathematics Subject Classification*: 47-XX, All AMS members \$22, List \$28, Order code THETA/3N



Riemann Surfaces of Infinite Genus

Joel Feldman, *University of British Columbia, Vancouver, Canada*, and Horst Knörrer and Eugene Trubowitz, *Eidgenössische Technische Hochschule, Zurich, Switzerland*

In this book, the authors geometrically construct Riemann surfaces of infinite genus by pasting together plane domains and handles. To achieve a meaningful generalization of the classical theory of Riemann surfaces to the case of infinite genus, one must impose restrictions on the asymptotic behavior of the Riemann surface. In the construction carried out here, these restrictions are formulated in terms of the sizes and locations of the handles and in terms of the gluing maps.

The approach used has two main attractions. The first is that much of the classical theory of Riemann surfaces, including the Torelli theorem, can be generalized to this class. The second is that solutions of Kadomcev-Petviashvili equations can be expressed in terms of theta functions associated with Riemann surfaces of infinite genus constructed in the book. Both of these are developed here. The authors also present in detail a number of important examples of Riemann surfaces of infinite genus (hyperelliptic surfaces of infinite genus, heat surfaces and Fermi surfaces).

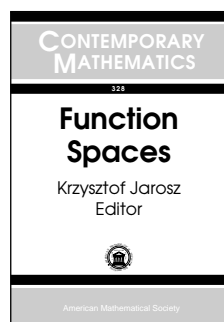
The book is suitable for graduate students and research mathematicians interested in analysis and integrable systems.

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

Contents: L^2 -cohomology, exhaustions with finite charge and theta series; The Torelli Theorem; Examples; The Kadomcev-Petviashvili equation; Bibliography.

CRM Monograph Series, Volume 20

June 2003, 296 pages, Hardcover, ISBN 0-8218-3357-X, LC 2003045110, 2000 *Mathematics Subject Classification*: 30F99, All AMS members \$63, List \$79, Order code CRMM/20N



Function Spaces

Krzysztof Jarosz, *Southern Illinois University, Edwardsville*, Editor

This volume presents papers from the Fourth Conference on Function Spaces. The conference brought together mathematicians interested in various problems within the general area of function spaces, allowing for discussion and exchange of ideas on those

problems and related questions.

The lectures covered a broad range of topics, including spaces and algebras of analytic functions of one and of many variables (and operators on such spaces), L^p -spaces, spaces of

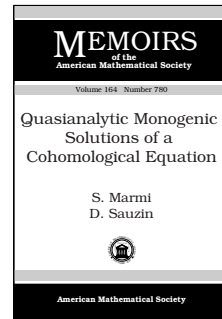
Banach-valued functions, isometries of function spaces, geometry of Banach spaces, and related subjects.

Included are 26 articles written by leading experts. Known results, open problems, and new discoveries are featured. Most papers are written for nonexperts, so the book can serve as a good introduction to the material presented.

Contents: P. Aiena and F. Villafañe, Components of resolvent sets and local spectral theory; J. R. Akeroyd, The Fejér-Riesz inequality and the index of the shift; J. T. Anderson and J. Wermer, A Cauchy-Green formula on the unit sphere in \mathbb{C}^2 ; H. Arizmendi, A. Carrillo, and L. Palacios, On α -dual algebras; R. M. Aron and M. Maestre, A connected metric space that is not separably connected; P. Bandyopadhyay and S. Dutta, Weighted Chebyshev centres and intersection properties of balls in Banach spaces; P. Beneker and J. Wiegerinck, The boundary of the unit ball in H^1 -type spaces; D. P. Blecher and D. M. Hay, Complete isometries - an illustration of noncommutative functional analysis; K. Boulabiar, G. Buskes, and A. Triki, Some recent trends and advances in certain lattice ordered algebras; E. Briem, An extension of a theorem of Wermer, Bernard, Sidney and Hatori to algebras of functions on locally compact spaces; Q. Bu, Some mapping properties of p -summing operators with Hilbertian domain; A. Curnock, J. Howroyd, and N.-C. Wong, The unique decomposition property and the Banach-Stone theorem; T. Dawson, A survey of algebraic extensions of commutative, unital normed algebras; P. N. Dowling, C. J. Lennard, and B. Turett, Some more examples of subsets of c_0 and $L^1[0, 1]$ failing the fixed point property; P. Gorkin, R. Mortini, and D. Suárez, Homotopic composition operators on $H^\infty(B^n)$; J. J. Grobler and M. De Kock, Characterization of conditional expectation in terms of positive projections; M. Haralampidou, The Krull nature of locally C^* -algebras; O. Hatori, T. Ishii, T. Miura, and S.-E. Takahasi, Characterizations and automatic linearity for ring homomorphisms on algebras of functions; H. Jarchow and U. Kollbrunner, Carleson embeddings for weighted Bergman spaces; K. Jarosz and T. S. S. R. K. Rao, Weak*-extreme points of injective tensor product spaces; K.-T. Kim and S. G. Krantz, Determining sets and fixed points for holomorphic endomorphisms; T. L. Miller, V. G. Miller, and M. M. Neumann, Localization in the spectral theory of operators on Banach spaces; V. Runde, Abstract harmonic analysis, homological algebra, and operator spaces; D. Sherman, Relative tensor products for modules over von Neumann algebras; S. J. Sidney, Uniform algebras generated by unimodular functions; T. Tonev and S. A. Grigoryan, Analytic functions on compact groups and their applications to almost periodic functions.

Contemporary Mathematics, Volume 328

June 2003, 322 pages, Softcover, ISBN 0-8218-3269-7, LC 2003045306, 2000 *Mathematics Subject Classification*: 32H02, 46E25, 46H05, 46J10, 46J15, 46L07, 47A10, 47B38, 47L10, 54D05, **All AMS members \$63**, List \$79, Order code CONM/328N



Quasianalytic Monogenic Solutions of a Cohomological Equation

S. Marmi, *University of Udine, Italy*, and D. Sauzin, *Astronomie et Systems Dynamiques, Paris*

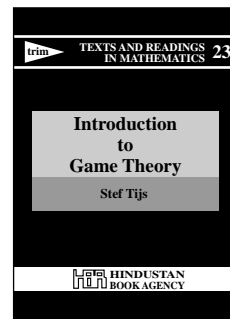
This item will also be of interest to those working in differential equations.

Contents: Introduction; Monogenic properties of the solutions of the cohomological equation; Carleman classes at diophantine points; Resummation at resonances and constant-type points; Conclusions and applications; Appendix; Bibliography.

Memoirs of the American Mathematical Society, Volume 164, Number 780

July 2003, 83 pages, Softcover, ISBN 0-8218-3325-1, LC 2003048024, 2000 *Mathematics Subject Classification*: 37F50, 30D60, 30G30, 11A55, 11J06, 40G10, 34M37, **Individual member \$29**, List \$49, Institutional member \$39, Order code MEMO/164/780N

Applications



Introduction to Game Theory

Stef Tijs, *Tilburg University, Netherlands*

This book is an introductory graduate-level text on game theory that grew out of courses in mathematics and economics and operations research.

Game theory deals with mathematical models of conflict and cooperation. In

the first nine chapters, the author covers noncooperative games in extensive and strategic form and some economic applications. Relations with the theory of linear programming and the theory of linear complementarity are indicated.

The last chapter treats different types of cooperative games and solution concepts. Discussed are economic applications and applications in OR-situations with multiple agents.

The book includes a rich collection of exercises, partly with solutions.

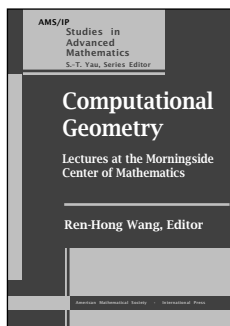
A publication of the Hindustan Book Agency. Distributed exclusively by the American Mathematical Society in North America and worldwide on the AMS Bookstore.

Contents: Introduction; Games in strategic form; Two-person zero-sum games; Mixed extensions of bimatrix games; The Nash equilibria of a 3-person game; Linear programming and matrix games; Linear complementarity and bimatrix games; Potential games; Other topics in non-cooperative game theory; Games in coalitional form; The imputation set and the core; Linear production games; Dominance, the D -core and stable sets; The Shapley value; The τ -value; The nucleolus;

Bargaining games; NTU-games; The NTU-value; Solutions of exercises; Extra exercises; Bibliography; Index.

Hindustan Book Agency

March 2003, 176 pages, Hardcover, ISBN 81-85931-37-2, 2000 *Mathematics Subject Classification*: 91Axx, All AMS members \$24, List \$30, Order code HIN/13N



Computational Geometry

Lectures at the Morningside Center of Mathematics

Ren-Hong Wang, *Dalian University of Technology, PRC*, Editor

Computational geometry is a borderline subject related to pure and applied mathematics, computer science, and engineering. The book contains articles on various topics in computational geometry based on invited lectures and contributed papers presented during the program on computational geometry at the Morningside Center of Mathematics at the Chinese Academy of Sciences (Beijing).

The opening article by R.-H. Wang gives a nice survey of various aspects of computational geometry, many of which are discussed in detail in the volume. Topics of the other articles include problems of optimal triangulation, splines, data interpolation, problems of curve and surface design, problems of shape control, quantum teleportation, and more.

The book is suitable for graduate students and researchers interested in computational geometry and specialists in theoretical computer science.

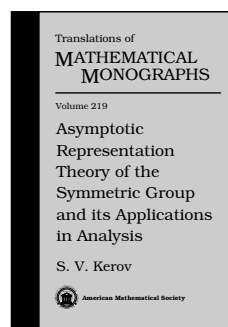
Titles in this series are copublished with International Press, Cambridge, MA.

Contents: R.-H. Wang, On computational geometry; B. A. Barsky, Geometry for analysis of corneal shape; C. Falai, Approximate implicitization of rational surfaces; H. Du, A geometric approach to $\dim S_2^1(\Delta_{MS})$; N. Dyn, S. Hed, and D. Levin, Subdivision for C^1 surface interpolation; G. Farin and D. Hansford, A permanence principle for shape control; G. Feng, T. Wu, K. Yu, S. Zhang, and Y. Zhou, Blending several implicit algebraic surfaces with ruled surfaces; G. Nürnberger and F. Zeilfelder, Lagrange interpolation by splines on triangulations; E. Binz and W. Schempp, Quantum teleportation and spin echo: A unitary symplectic spinor approach; X. Shi and R.-H. Wang, The generalization of Pascal's theorem and Morgan-Scott's partition; C. R. Traas, 'Optimal' triangulation of surfaces and bodies; R.-H. Wang, Multivariate spline and geometry; Z. Wu, Geometric continuous B-spline—A generalization of the approach of γ -spline; G. Xu, Adaptive and smooth surface construction by triangular A-patches; G. Zhao and R.-H. Wang, A B-spline function in $s_3^1(R^3, \Delta_2^*)$.

AMS/IP Studies in Advanced Mathematics, Volume 34

July 2003, 235 pages, Softcover, ISBN 0-8218-2044-3, LC 2003045381, 2000 *Mathematics Subject Classification*: 35-02, 35L67; 35L60, 35L80, 76N10, 46N20, All AMS members \$47, List \$59, Order code AMSIP/34N

Discrete Mathematics and Combinatorics



Asymptotic Representation Theory of the Symmetric Group and its Applications in Analysis

S. V. Kerov

This book reproduces the doctoral thesis written by a remarkable mathematician, Sergei V. Kerov. His untimely death at age 54 left the mathematical community with an extensive body of work and this one-of-a-kind monograph. In it, he gives a clear and lucid account of results and methods of asymptotic representation theory. The book is a unique source of information on an important topic of current research.

Asymptotic representation theory of symmetric groups deals with problems of two types: asymptotic properties of representations of symmetric groups of large order and representations of the limiting object, i.e., the infinite symmetric group. The author contributed significantly in the development of both directions. His book presents an account of these contributions, as well as those of other researchers.

Among the problems of the first type, the author discusses the properties of the distribution of the normalized cycle length in a random permutation and the limiting shape of a random (with respect to the Plancherel measure) Young diagram. He also studies stochastic properties of the deviations of random diagrams from the limiting curve.

Among the problems of the second type, Kerov studies the important problem of computing irreducible characters of the infinite symmetric group. This leads to the study of a continuous analog of the notion of Young diagram, and in particular, to a continuous analogue of the hook walk algorithm, which is well known in the combinatorics of finite Young diagrams. In turn, this construction provides a completely new description of the relation between the classical moment problems of Hausdorff and Markov.

The book is suitable for graduate students and research mathematicians interested in representation theory and combinatorics.

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

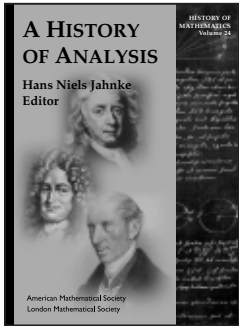
Contents: Introduction; Boundaries and dimension groups of certain graphs; The boundary of the Young graph and MacDonal polynomials; The Plancherel measure of the symmetric group; Young diagrams in problems of analysis; References; Comments on Kerov's thesis by G. Olshanski; Additional references.

Translations of Mathematical Monographs, Volume 219

July 2003, 201 pages, Hardcover, ISBN 0-8218-3440-1, LC 2003049556, 2000 *Mathematics Subject Classification*: 20C30, 20P05, 22D10, All AMS members \$68, List \$85, Order code MMONO/219N

General and Interdisciplinary

Supplementary Reading



A History of Analysis

Hans Niels Jahnke, *University of Essen, Germany*, Editor

Analysis as an independent subject was created as part of the scientific revolution in the seventeenth century. Kepler, Galileo, Descartes, Fermat, Huygens, Newton, and Leibniz, to name but a few, contributed to its genesis. Since the end of the seven-

teenth century, the historical progress of mathematical analysis has displayed unique vitality and momentum. No other mathematical field has so profoundly influenced the development of modern scientific thinking.

Describing this multidimensional historical development requires an in-depth discussion which includes a reconstruction of general trends and an examination of the specific problems. This volume is designed as a collective work of authors who are proven experts in the history of mathematics. It clarifies the conceptual change that analysis underwent during its development while elucidating the influence of specific applications and describing the relevance of biographical and philosophical backgrounds.

The first ten chapters of the book outline chronological development and the last three chapters survey the history of differential equations, the calculus of variations, and functional analysis.

Special features are a separate chapter on the development of the theory of complex functions in the nineteenth century and two chapters on the influence of physics on analysis. One is about the origins of analytical mechanics, and one treats the development of boundary-value problems of mathematical physics (especially potential theory) in the nineteenth century.

The book presents an accurate and very readable account of the history of analysis. Each chapter provides a comprehensive bibliography. Mathematical examples have been carefully chosen so that readers with a modest background in mathematics can follow them. It is suitable for mathematical historians and a general mathematical audience.

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

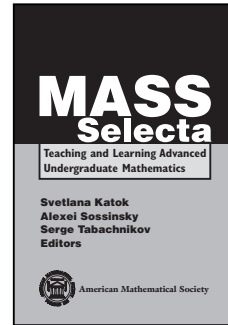
Copublished with the London Mathematical Society. Members of the LMS may order directly from the AMS at the AMS member price. The LMS is registered with the Charity Commissioners.

Contents: **R. Thiele**, Antiquity; **J. van Maanen**, Precursors of differentiation and integration; **N. Guicciardini**, Newton's method and Leibniz's calculus; **H. N. Jahnke**, Algebraic analysis in the 18th century; **M. Panza**, The origins of analytic mechanics in the 18th century; **J. Lützen**, The foundation of analysis in the 19th century; **T. Archibald**, Analysis and physics in the nineteenth century: The case of boundary-value problems; **U. Bottazzini**, Complex function theory, 1780-1900; **T. Hochkirchen**, Theory of measure and integration from Riemann to Lebesgue; **M. Epple**, The end of the science of

quantity: Foundations of analysis, 1860-1910; **T. Archibald**, Differential equations: A historical overview to circa 1900; **C. Fraser**, The calculus of variations: A historical survey; **R. Siegmund-Schultze**, The origins of functional analysis; Index of names; Subject index.

History of Mathematics, Volume 24

August 2003, approximately 432 pages, Hardcover, ISBN 0-8218-2623-9, LC 2003041836, 2000 *Mathematics Subject Classification*: 01A05, 26-03, 28-03, 30-03, 31-03, 33-03, 34-03, 35-03, 40-03, 45-03, 49-03, **All AMS members \$71**, List \$89, Order code HMATH/24N



MASS Selecta

Teaching and Learning Advanced Undergraduate Mathematics

Svetlana Katok, **Alexei Sossinsky**, and **Serge Tabachnikov**, *Pennsylvania State University, University Park*, Editors

This book results from a unique and innovative program at Pennsylvania State University. Under the program, the "best of the best" students nationwide are chosen to study challenging mathematical areas under the guidance of experienced mathematicians. This program, Mathematics Advanced Study Semesters (MASS), offers an unparalleled opportunity for talented undergraduate students who are serious in the pursuit of mathematical knowledge.

This volume represents various aspects of the MASS program over its six-year existence, including core courses, summer courses, students' research, and colloquium talks. The book is most appropriate for college professors of mathematics who work with bright and eager undergraduate and beginning graduate students, for such students who want to expand their mathematical horizons, and for everyone who loves mathematics and wants to learn more interesting and unusual material.

The first half of the book contains lecture notes of nonstandard courses. A text for a semester-long course on p -adic analysis is centered around contrasts and similarities with its real counterpart. A shorter text focuses on a classical area of interplay between geometry, algebra and number theory (continued fractions, hyperbolic geometry and quadratic forms). Also provided are detailed descriptions of two innovative courses, one on geometry and the other on classical mechanics. These notes constitute what one may call the skeleton of a course, leaving the instructor ample room for innovation and improvisation.

The second half of the book contains a large collection of essays on a broad spectrum of exciting topics from Hilbert's Fourth Problem to geometric inequalities and minimal surfaces, from mathematical billiards to fractals and tilings, from unprovable theorems to the classification of finite simple groups and lexicographic codes.

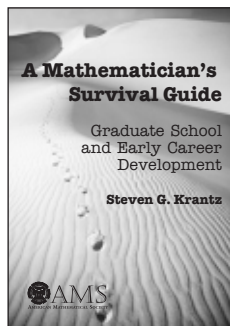
Contents: **S. Katok** and **S. Tabachnikov**, A brief description of MASS program; **G. E. Andrews**, Teaching in the MASS program;

Lecture notes: **S. Katok**, p -adic analysis in comparison with real; **M. Levi**, Geometrical methods of mechanics; **A. Katok**, Geometric structures, symmetry and elements of Lie groups; **S. Katok**, Continued fractions, hyperbolic geometry and quadratic forms; *MASS colloquium:* **S. Tabachnikov**, MASS colloquium; **J. C. Álvarez Paiva**, Hilbert's fourth problem in two dimensions; **J. Conway**, Integral lexicographic codes; **E. Formanek**, The classification of finite simple groups; **G. Galperin**, Billiard balls count π ; **V. Niţică**, Rep-tiles revisited; **Y. Pesin**, Fractals and dynamics; **S. G. Simpson**, Unprovable theorems and fast-growing functions; **A. B. Sossinsky**, Minimal surfaces and random walks; **S. Tabachnikov**, The tale of a geometric inequality; *Student research papers:* **M. Guysinsky**, Summer REU program at Penn State; **S. Chuba**, Partitions of n and connected triangles; **J. Kantor** and **M. Maydanskiy**, Triangles gone wild; **A. Medvedev**, Determinacy of games; **J. Voight**, On the nonexistence of odd perfect numbers; *Appendices:* **S. Katok**, **A. Sossinsky**, and **S. Tabachnikov**, MASS courses and instructors; **S. Katok**, **A. Sossinsky**, and **S. Tabachnikov**, MASS colloquia; **S. Katok**, **A. Sossinsky**, and **S. Tabachnikov**, MASS participants.

June 2003, 313 pages, Hardcover, ISBN 0-8218-3363-4, LC 2003045185, 2000 *Mathematics Subject Classification:* 00-01, 00-02, **All AMS members \$47**, List \$59, Order code MASSN

Recommended Reading

Supplementary Reading



A Mathematician's Survival Guide

Graduate School and Early Career Development

Steven G. Krantz, *Washington University, St. Louis, MO*

With graduate school, young mathematicians take the first step toward a career in mathematics. During this period, they make important decisions that will affect the rest of their careers. Here now is a detailed guide to help students navigate those years and the years that follow.

In his inimitable and forthright style, Steven Krantz addresses the major issues of graduate school, including deciding where to go, passing the qualifying exams, finding an advisor, writing a thesis, and getting that first job. As with his earlier guide, *How to Teach Mathematics*, Krantz avoids generalities, giving clear advice on how to handle real situations. In addition, he includes a description of the basic elements of a mathematical education, as well as three appendices on the structure of a typical department and university and the standard academic ranks.

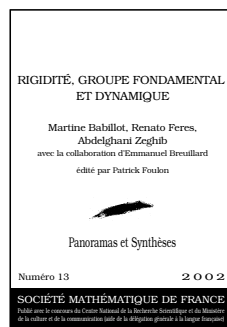
Steven G. Krantz is an experienced mathematician and an award-winning author. He has worked in many different types of mathematics departments, supervised both masters and doctoral students, and is currently the Chair of the Mathematics Department at Washington University in St. Louis.

Other AMS titles by Steven Krantz are *A Primer of Mathematical Writing* and *Techniques of Problem Solving*.

Contents: *Getting ready for graduate school:* Heading off to graduate school; Preliminaries; *Essential elements of a graduate education:* Pre-thesis work; Thesis work; *Sticky wickets:* Practical difficulties; Moral difficulties; *Post-graduate-school existence:* Life after the thesis; Afterthoughts; *The elements of mathematics:* Mathematics I need to know; Glossary; The administrative structure of a mathematics department and a university; The academic ranks; The academic composition of a mathematics department; A checklist for graduate school; Bibliography; Index.

August 2003, approximately 240 pages, Softcover, ISBN 0-8218-3455-X, 2000 *Mathematics Subject Classification:* 00-01, **All AMS members \$22**, List \$28, Order code GSCMN

Geometry and Topology



Rigidité, groupe fondamental et dynamique

Martine Babilot, *Université d'Orleans, France*,
Renato Feres, *Washington University, St Louis, MO*, and
Abdelghani Zeghib, *Institut de Recherche Mathématique Avancée, CNRS, Strasbourg, France*

This volume presents recent progress in the domain of geometric structures and group actions. M. Babilot shows the contribution of dynamics and ergodic theory in the analysis of the quantitative version of the Oppenheim conjecture or for discrete nonelementary isometry groups of noncompact manifolds with negative curvature. R. Feres introduces Gromov's approach to rigid geometric structures, gives various Zimmer-type super-rigidity results, and presents a very nice theorem of Gromov concerning the fundamental group of analytic manifolds equipped with a unimodular A -rigid structure. A. Zeghib demonstrates how a clever use of partially algebraic sets and of control theory leads to a new simple proof of the dense-open orbit theorem.

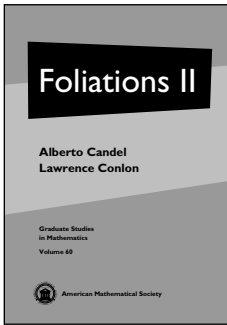
A publication of the Société Mathématique de France. Distributed by the AMS in North America. Orders from other countries should be sent to the SMF, Maison de la SMF, B.P. 67, 13274 Marseille cedex 09, France, or to Institut Henri Poincaré, 11 rue Pierre et Marie Curie, 75231 Paris cedex 05, France.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

Contents: **M. Babilot**, Points entiers et groupes discrets: de l'analyse aux systèmes dynamiques; **R. Feres**, Rigid geometric structures and actions of semisimple Lie groups; **A. Zeghib**, Sur les groupes de transformations rigides: théorème de l'orbite dense-ouverte.

Panoramas et Synthèses, Number 13

February 2003, 188 pages, Softcover, ISBN 2-85629-134-1, 2000 *Mathematics Subject Classification:* 11F72, 11J25, 11P21, 14P99, 20H10, 22E40, 37A17, 37A25, 37A45, 37Cxx, 37D40, 51L99, 53Cxx, 58H99, 93A99, 20F67, 37C85, **Individual member \$30**, List \$33, Order code PASY/13N

Supplementary Reading



Foliations II

Alberto Candel, *California State University, Northridge*, and Lawrence Conlon, *Washington University, St. Louis, MO*

From reviews for *Foliations I*:

Overall presentation is first-rate ... diagrams ... are well-crafted and reflect the strongly "graphical" nature

of the subject ... A prospective reader who cares to invest the time needed to plough seriously through the book ought to be rewarded with a gratifying mathematical experience ... can also be recommended to more advanced researchers, who would enjoy seeing a compendium of major results.

—*Bulletin of the LMS*

The authors pay great attention to examples, and you can find a large number of them in the book ... They are well-chosen and will keep the interest of the reader on a high level ... [The book is] a fundamental source for everybody with a serious interest in foliations.

—*European Mathematical Society Newsletter*

The large number of well-chosen examples is one of the most striking features of the book ... [It] contains several beautiful figures which help one to imagine and better understand situations described formally in the text. Therefore, graduate students, young researchers, and in fact, everybody interested in foliations should profit from this book.

—*Mathematical Reviews*

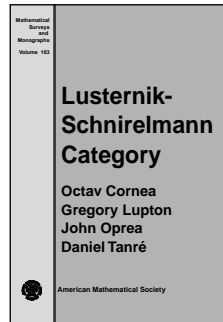
This is the second of two volumes on the qualitative theory of foliations. For this volume, the authors have selected three special topics: analysis on foliated spaces, characteristic classes of foliations, and foliated manifolds. Each of these is an example of deep interaction between foliation theory and some other highly-developed area of mathematics. In all cases, the authors present useful, in-depth introductions, which lead to further study using the extensive available literature.

This comprehensive volume has something to offer a broad spectrum of readers: from beginners to advanced students to professional researchers. It contains exercises and many illustrations. The book would make an elegant supplementary text for a topics course at the advanced graduate level. *Foliations I* is Volume 23 in the AMS series, Graduate Studies in Mathematics.

Contents: *Part 1: Analysis and geometry on foliated spaces:* Foreword to part 1; The C^* -algebra of a foliated space; Harmonic measures for foliated spaces; Generic leaves; *Part 2: Characteristic classes and foliations:* Foreword to part 2; The Euler class of circle bundles; The Chern-Weil construction; Characteristic classes and integrability; The Godbillon-Vey classes; *Part 3: Foliated 3-manifolds:* Foreword to part 3; Constructing foliations; Reebless foliations; Foliations and the Thurston norm; Disk decomposition and foliations of link complements; *Appendices:* C^* -Algebras; Riemannian geometry and heat diffusion; Brownian motion; Planar foliations; Bibliography; Index.

Graduate Studies in Mathematics, Volume 60

August 2003, approximately 560 pages, Hardcover, ISBN 0-8218-0881-8, LC 99-045694, 2000 *Mathematics Subject Classification:* 57R30, **All AMS members \$63**, List \$79, Order code GSM/60N



Lusternik-Schnirelmann Category

Octav Cornea, *Université de Montréal, QC, Canada*, Gregory Lupton and John Oprea, *Cleveland State University, OH*, and Daniel Tanré, *Université de Lille, France*

Lusternik-Schnirelmann category is like a Picasso painting. Looking at category from different perspectives produces completely different impressions of category's beauty and applicability.

—from the *Introduction*

Lusternik-Schnirelmann category is a subject with ties to both algebraic topology and dynamical systems. The authors take LS-category as the central theme, and then develop topics in topology and dynamics around it. Included are exercises and many examples. The book presents the material in a rich, expository style.

The book provides a unified approach to LS-category, including foundational material on homotopy theoretic aspects, the Lusternik-Schnirelmann theorem on critical points, and more advanced topics such as Hopf invariants, the construction of functions with few critical points, connections with symplectic geometry, the complexity of algorithms, and category of 3-manifolds.

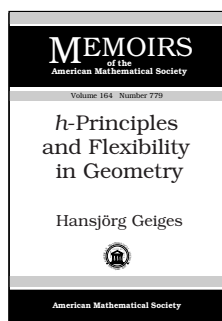
This is the first book to synthesize these topics. It takes readers from the very basics of the subject to the state of the art. Prerequisites are few: two semesters of algebraic topology and, perhaps, differential topology. It is suitable for graduate students and researchers interested in algebraic topology and dynamical systems.

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

Contents: Introduction to LS-category; Lower bounds for LS-category; Upper bounds for category; Localization and category; Rational homotopy and category; Hopf invariants; Category and critical points; Category and symplectic topology; Examples, computations and extensions; Topology and analysis; Basic homotopy; Bibliography; Index.

Mathematical Surveys and Monographs, Volume 103

July 2003, 330 pages, Hardcover, ISBN 0-8218-3404-5, LC 2003048136, 2000 *Mathematics Subject Classification:* 55M30, 55P62, 55Q25, 57R17, 58E05, 37B30, 53D35; 53D12, 55P60, 37C99, **All AMS members \$67**, List \$84, Order code SURV/103N



h-Principles and Flexibility in Geometry

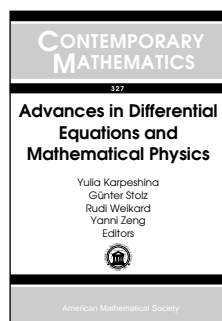
Hansjörg Geiges, *University of Cologne, Germany*

Contents: Introduction; Differential relations and *h*-principles; The *h*-principle for open, invariant relations; Convex integration theory; Bibliography.

Memoirs of the American Mathematical Society, Volume 164, Number 779

July 2003, 58 pages, Softcover, ISBN 0-8218-3315-4, LC 2003048025, 2000 *Mathematics Subject Classification*: 53C23; 57R42, 53Dxx, **Individual member \$27**, List \$45, Institutional member \$36, Order code MEMO/164/779N

Mathematical Physics



Advances in Differential Equations and Mathematical Physics

Yulia Karpeshina, Günter Stolz, Rudi Weikard, and Yanni Zeng, *University of Alabama, Birmingham*, Editors

This volume presents the proceedings of the 9th International Conference on Differential Equations and Mathematical Physics. It contains 29 research and survey papers contributed by conference participants. The conference provided researchers a forum to present and discuss their recent results in a broad range of areas encompassing the theory of differential equations and their applications in mathematical physics.

Papers in this volume represent some of the most interesting results and the major areas of research that were covered, including spectral theory with applications to non-relativistic and relativistic quantum mechanics, including time-dependent and random potential, resonances, many body systems, pseudodifferential operators and quantum dynamics, inverse spectral and scattering problems, the theory of linear and nonlinear partial differential equations with applications in fluid dynamics, conservation laws and numerical simulations, as well as equilibrium and nonequilibrium statistical mechanics.

The volume is intended for graduate students and researchers interested in mathematical physics.

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

Contents: A. A. Balinsky and W. D. Evans, Zero modes of Pauli and Weyl-Dirac operators; R. D. Benguria, The Lane-Emden equation revisited; C. Bennewitz, A Paley-Wiener

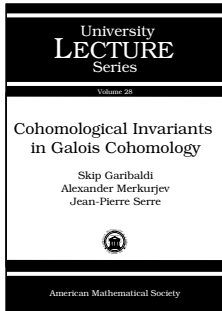
theorem with applications to inverse spectral theory; B. M. Brown and M. S. P. Eastham, Zero-free regions for Jost functions: The Bessel case; G.-Q. Chen, Concentration in solutions to hyperbolic conservation laws; J.-M. Combes, P. D. Hislop, and F. Klopp, Local and global continuity of the integrated density of states; O. Costin, R. D. Costin, and J. L. Lebowitz, Transition to the continuum of a particle in time-periodic potentials; D. Damanik, Quantum dynamical bounds for one-dimensional quasicrystals; D. Gioev, Lower order terms in Szegő theorems on Zoll manifolds; J. Glimm, S. Hou, Y.-H. Lee, D. H. Sharp, and K. Ye, Solution error models for uncertainty quantification; J. A. Goldstein and I. Kombe, Instantaneous blow up; G. A. Hagedorn, Simplified semiclassical propagation estimates; M. Hitrik and I. Polterovich, Resolvent expansions and trace regularizations for Schrödinger operators; V. Jakšić and C.-A. Pillet, A note on the entropy production formula; V. Kostrykin, K. A. Makarov, and A. K. Motovilov, Existence and uniqueness of solutions to the operator Riccati equation. A geometric approach; P. Kuchment and H. Zeng, Asymptotics of spectra of Neumann Laplacians in thin domains; A. Laptev and O. Safronov, Absolutely continuous spectrum of matrix valued Schrödinger operators; D. Lenz, Ergodic theory and discrete one-dimensional random Schrödinger operators: Uniform existence of the Lyapunov exponent; E. H. Lieb and R. Seiringer, Bose-Einstein condensation of dilute gases in traps; B. Nachtergaele, W. L. Spitzer, and S. Starr, On the dynamics of interfaces in the ferromagnetic XXZ chain under weak perturbations; N. Pavlović, Bounds for sums of powers of eigenvalues of Schrödinger operators via the commutation method; L. Rey-Bellet, Statistical mechanics of anharmonic lattices; R. Shvidkoy and Y. Latushkin, The essential spectrum of the linearized 2d Euler operator is a vertical band; J. P. Solovej and W. L. Spitzer, New coherent states and a new proof of the Scott correction; B. Su, Remark on weak solutions of stationary conduction-convection problems; V. Tkachenko, Spectrum of 1-d selfadjoint periodic differential operator of order 4; K. Trivisa, BV estimates for $n \times n$ systems of conservation laws; R. Weder, The time-dependent approach to inverse scattering; R. Young, Blowup in hyperbolic conservation laws.

Contemporary Mathematics, Volume 327

June 2003, 387 pages, Softcover, ISBN 0-8218-3296-4, LC 2003045382, 2000 *Mathematics Subject Classification*: 34-06, 35-06, 76-06, 81-06, 82-06, **All AMS members \$79**, List \$99, Order code CONM/327N

Number Theory

Independent Study



Cohomological Invariants in Galois Cohomology

Skip Garibaldi, *Emory University, Atlanta*,
Alexander Merkurjev,
University of California, Los Angeles, and **Jean-Pierre Serre**,
Collège de France, Paris

This volume addresses algebraic invariants that occur in the confluence of several important areas of mathematics, including number theory, algebra, and arithmetic algebraic geometry. The invariants are analogues for Galois cohomology of the characteristic classes of topology, which have been extremely useful tools in both topology and geometry. It is hoped that these new invariants will prove similarly useful. Early versions of the invariants arose in the attempt to classify the quadratic forms over a given field.

The authors are well-known experts in the field. Serre, in particular, is recognized as both a superb mathematician and a master author. His book on Galois cohomology from the 1960s was fundamental to the development of the theory. Merkurjev, also an expert mathematician and author, co-wrote *The Book of Involutions* (Volume 44 in the AMS Colloquium Publications series), an important work that contains preliminary descriptions of some of the main results on invariants described here.

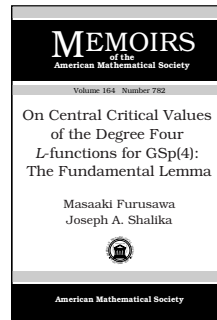
The book also includes letters between Serre and some of the principal developers of the theory. It will be of interest to graduate students and research mathematicians interested in number theory and Galois cohomology.

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

Contents: *Cohomological invariants, Witt invariants, and trace forms:* Contents; Introduction; The notion of “invariant”; Cohomological preliminaries: The local case; Cohomological preliminaries: The function field case; Specialization properties of cohomological invariants; Restriction and corestriction of invariants; Cohomological invariants of O_n, SO_n, \dots ; Cohomological invariants of étale algebras; Witt invariants; The trace form in dimension ≤ 7 ; A letter from M. Rost to J-P. Serre; A letter from J-P. Serre to R. S. Garibaldi; A letter from B. Totaro to J-P. Serre; *Rost invariants of simply connected algebraic groups:* Contents; Rost invariants of simply connected algebraic groups; The groups $H^{d+1}(F, \mathbb{Q}/\mathbb{Z}(d))$; Tables of Dynkin indices; Bibliography; Index of notation; Index of terms.

University Lecture Series, Volume 28

July 2003, approximately 176 pages, Softcover, ISBN 0-8218-3287-5, LC 2003048151, 2000 *Mathematics Subject Classification:* 12G05, 11E72, **All AMS members \$28**, List \$35, Order code ULECT/28N



On Central Critical Values of the Degree Four L -functions for $GSp(4)$: The Fundamental Lemma

Masaaki Furusawa, *Osaka City University, Japan*, and
Joseph A. Shalika, *Johns Hopkins University, Baltimore, MD*

Contents: Statement of results; Gauss sum, Kloosterman sum and Salié sum; Matrix argument Kloosterman sums; Evaluation of the Novodvorsky orbital integral; Evaluation of the Bessel orbital integral; Evaluation of the quadratic orbital integral; Bibliography.

Memoirs of the American Mathematical Society, Volume 164, Number 782

July 2003, 139 pages, Softcover, ISBN 0-8218-3328-6, LC 2003048027, 2000 *Mathematics Subject Classification:* 11F46, 11F70, 11L05; 11F67, 11F72, 22E50, 22E55, **Individual member \$33**, List \$55, Institutional member \$44, Order code MEMO/164/782N