

New Publications Offered by the AMS

New Series from the AMS!

The AMS is pleased to announce the *Student Mathematical Library*, a new series of undergraduate studies in mathematics. By emphasizing original topics and approaches, the series aims to broaden students' mathematical experiences. We hope the books will spark undergraduates' appreciation for research mathematics by introducing them to interesting, accessible topics of modern mathematics. The books published in the series are suitable for honors courses, upper-division seminars, reading courses or self-study.

Advance Notice

Recommended Text

An Introduction to the Mathematical Theory of Waves

Roger A. Knobel, *University of Texas-Pan American, Edinburg*

This book is based on an undergraduate course taught at the IAS/Park City Mathematics Institute, on linear and nonlinear waves. The first part of the text overviews the concept of a wave, describes one-dimensional waves using functions of two variables, provides an introduction to partial differential equations, and discusses computer-aided visualization techniques.

The second part of the book discusses traveling waves, leading to a description of solitary waves and soliton solutions of the Klein-Gordon and Korteweg-deVries equations. The wave equation is derived to model the small vibrations of a taut string, and solutions are constructed via d'Alembert's formula and Fourier series.

The last part of the book discusses waves arising from conservation laws. After deriving and discussing the scalar conservation law, its solution is described using the method of characteristics, leading to the formation of shock and rarefaction waves. Applications of these concepts are then given for models of traffic flow.

The intent of this book is to create a text suitable for independent study by undergraduate students in mathematics, engineering, and science. The content of the book is meant to be self-contained, requiring no special reference material. Access to computer software such as Mathematica®, MATLAB®, or Maple® is recommended, but not necessary. Scripts for MATLAB applications will be available via a Web site. Exercises are given within the text to allow further practice with selected topics.

- © Wolfram Research, Inc., Champaign IL.
- © The Math Works, Inc., Natick, MA.
- © Waterloo Maple, Inc., Ontario, Canada.

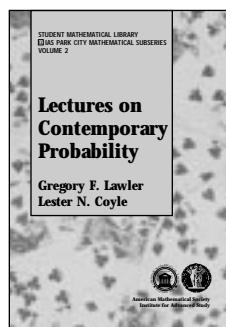
Student Mathematical Library

October 1999 (estimated), approximately 200 pages, Softcover, ISBN 0-8218-2039-7, All AMS members \$18, List \$23, Order code STML-KNOBELN

Recommended Text

Lectures on Contemporary Probability

Gregory F. Lawler, *Duke University, Durham, NC*, and
Lester N. Coyle, *Loyola College, Baltimore, MD*



This volume is based on classes in probability for advanced undergraduates held at the IAS/Park City Mathematics Institute. It is derived from both lectures (Chapters 1-10) and computer simulations (Chapters 11-13) that were held during the program. The material is coordinated so that some of the major computer simulations relate to topics covered in the first ten chapters. The goal is to present topics that are accessible to advanced undergraduates, yet are areas of current research in probability. The combination of the lucid yet informal style of the lectures and the hands-on nature of the simulations allows readers to become familiar with some interesting and active areas of probability.

The first four chapters discuss random walks and the continuous limit of random walks: Brownian motion. Chapters 5 and 6 consider the fascinating mathematics of card shuffles, including the notions of random walks on a symmetric group and the general idea of random permutations.

Chapters 7 and 8 discuss Markov chains, beginning with a standard introduction to the theory. Chapter 8 addresses the recent important application of Markov chains to simulations of random systems on large finite sets: Markov Chain Monte Carlo.

Random walks and electrical networks are covered in Chapter 9. Uniform spanning trees, as connected to probability and random walks, are treated in Chapter 10.

The final three chapters of the book present simulations. Chapter 11 discusses simulations for random walks. Chapter 12 covers simulation topics such as sampling from continuous distributions, random permutations, and estimating the number of matrices with certain conditions using Markov Chain Monte Carlo. Chapter 13 presents simulations of stochastic differential equations for applications in finance.

Chapter 13 presents simulations of stochastic differential equations for applications in finance.

(The simulations do not require one particular piece of software. They can be done in symbolic computation packages or via programming languages such as C.)

The volume concludes with a number of problems ranging from routine to very difficult. Of particular note are problems that are typical of simulation problems given to students by the authors when teaching undergraduate probability.

Contents: Simple random walk and Stirling's formula; Simple random walk in many dimensions; Self-avoiding walk; Brownian motion; Shuffling and random permutations; Seven shuffles are enough (sort of); Markov chains on finite sets; Markov chain Monte Carlo; Random walks and electrical networks; Uniform spanning trees; Random walk simulations; Other simulations; Simulations in finance; Problems; Bibliography.

Student Mathematical Library

August 1999, approximately 120 pages, Softcover, ISBN 0-8218-2029-X, 1991 *Mathematics Subject Classification:* 60-02; 60J10, 60J15, 65C05, **All AMS members \$14**, List \$17, Order code STML-LAWLERN

Advance Notice

Independent Study

Prime Numbers and Their Distribution

Gérald Tenenbaum, *Université Henri Poincaré, Nancy I, France*, and Michel Mendès France, *Université Bordeaux I, France*

From a review for the French edition ...

This is a short introductory book on analytic number theory. The prerequisites are quite modest, but it still contains an impressive amount of information. A multitude of results is included, some of which were proved just recently ... this book is very well written. It is fun to read and at the same time presents most of the fundamental concepts and ideas in analytic number theory.

—*Mathematical Reviews*

The reviewer recommends it to all interested readers.

—*Zentralblatt für Mathematik*

We have been curious about numbers—and prime numbers—since antiquity. One notable new direction this century in the study of primes has been the influx of ideas from probability. The goal of this book is to provide insights into the prime numbers and to describe how a sequence so tautly determined can incorporate such a striking amount of randomness.

There are two ways in which the book is exceptional. First, some familiar topics are covered with refreshing insight and/or from new points of view. Second, interesting recent developments and ideas are presented that shed new light on the prime numbers and their distribution among the rest of the integers.

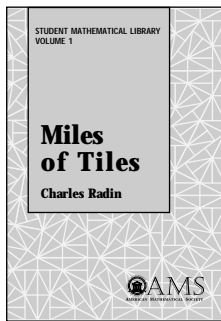
The book begins with a chapter covering some classic topics, such as quadratic residues and the Sieve of Eratosthenes. Also discussed are other sieves, primes in cryptography, twin primes, and more.

Two separate chapters address the Riemann zeta function and its connections to number theory. In the first chapter, the familiar link between $\zeta(s)$ and the distribution of primes is covered with remarkable efficiency and intuition. The second chapter presents a walk through an elementary proof of the Prime Number Theorem. To help the novice understand the “why” of the proof, connections are made along the way with more familiar results such as Stirling's formula.

A most distinctive chapter covers the stochastic properties of prime numbers. The authors present a wonderfully clever interpretation of primes in arithmetic progressions as a phenomenon in probability. They also describe Cramér's model, which provides a probabilistic intuition for formulating conjectures that have a habit of being true. In this context, they address interesting questions about equipartition modulo 1 for sequences involving prime numbers. The final section of the chapter compares geometric visualizations of random sequences with the visualizations for similar sequences derived from the primes. The resulting pictures are striking and illuminating. The book concludes with a chapter on the outstanding big conjectures about prime numbers.

This book is suitable for anyone who has had a little number theory and some advanced calculus involving estimates. Its engaging style and invigorating point of view will make refreshing reading for advanced undergraduates through

Supplementary Reading



Miles of Tiles

Charles Radin, *University of Texas, Austin*

In this book, we try to display the value (and joy!) of starting from a mathematically amorphous problem and combining ideas from diverse sources to produce new and significant mathematics—mathematics unforeseen from the motivating problem...

—*from the Preface*

The common thread throughout this book is aperiodic tilings; the best-known example is the “kite and dart” tiling. This tiling has been widely discussed, particularly since 1984 when it was adopted to model quasicrystals. The presentation uses many different areas of mathematics and physics to analyze the new features of such tilings. Although many people are aware of the existence of aperiodic tilings, and maybe even their origin in a question in logic, not everyone is familiar with their subtleties and the underlying rich mathematical theory. For the interested reader, this book fills that gap.

Understanding this new type of tiling requires an unusual variety of specialties, including ergodic theory, functional analysis, group theory and ring theory from mathematics, and statistical mechanics and wave diffraction from physics. This interdisciplinary approach also leads to new mathematics seemingly unrelated to the tilings. Included are many worked examples and a large number of figures. The book's multidisciplinary approach and extensive use of illustrations make it useful for a broad mathematical audience.

Contents: Ergodic theory; Physics (for mathematicians); Order; Symmetry; Conclusion; Geometry; Algebra; Analysis; List of symbols; Index; References.

Student Mathematical Library, Volume 1

July 1999, approximately 128 pages, Softcover, ISBN 0-8218-1933-X, LC 99-20662, 1991 *Mathematics Subject Classification:* 52C22; 58F11, 47A35, 82D25, 20H15, **All AMS members \$13**, List \$16, Order code STML/1N

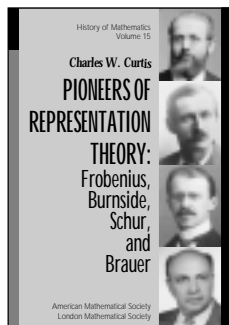
research mathematicians. This book is the English translation of the French edition.

Student Mathematical Library

December 1999 (estimated), approximately 120 pages, Softcover, ISBN 0-8218-1647-0, **All AMS members \$14**, List \$17, Order code STML-TENENBAUN

Algebra and Algebraic Geometry

Recommended Text



Pioneers of Representation Theory: Frobenius, Burnside, Schur, and Brauer

Charles W. Curtis, *University of Oregon, Eugene*

The year 1897 was marked by two important mathematical events: the publication of the first paper on representations of finite groups by Ferdinand Georg Frobenius (1849-1917) and the appearance of the first treatise in English on the theory of finite groups by William Burnside (1852-1927). Burnside soon developed his own approach to representations of finite groups. In the next few years, working independently, Frobenius and Burnside explored the new subject and its applications to finite group theory.

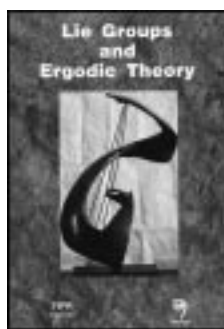
They were soon joined in this enterprise by Issai Schur (1875-1941) and some years later, by Richard Brauer (1901-1977). These mathematicians' pioneering research is the subject of this book. It presents an account of the early history of representation theory through an analysis of the published work of the principals and others with whom the principals' work was interwoven. Also included are biographical sketches and enough mathematics to enable readers to follow the development of the subject. An introductory chapter contains some of the results involving characters of finite abelian groups by Lagrange, Gauss, and Dirichlet, which were part of the mathematical tradition from which Frobenius drew his inspiration.

This book presents the early history of an active branch of mathematics. It includes enough detail to enable readers to learn the mathematics along with the history. The volume would be a suitable text for a course on representations of finite groups, particularly one emphasizing an historical point of view.

Contents: Some 19th-century algebra and number theory; Frobenius and the invention of character theory; Burnside: Representations and structure of finite groups; Schur: A new beginning; Polynomial representations of $GL_n(\mathbb{C})$; Richard Brauer and Emmy Noether: 1926-1933; Modular representation theory; Bibliography; Index.

History of Mathematics, Volume 15

August 1999, approximately 319 pages, Hardcover, ISBN 0-8218-9002-6, LC 99-14983, 1991 *Mathematics Subject Classification*: 01A55, 01A60, 20C15, 20C20; 01A70, 16G10, 20G05, **All AMS members \$39**, List \$49, Order code HMATH/15N



Lie Groups and Ergodic Theory

S. G. Dani, *Tata Institute of Fundamental Research, Mumbai, India*, Editor

A publication of Tata Institute of Fundamental Research.

This volume presents the proceedings from an international colloquium on Lie groups and ergodic theory held at

the Tata Institute of Fundamental Research (TIFR) in Mumbai, India. Designated a *Golden Jubilee* event at the Institute, this was one of the quadrennial colloquia of the School of Mathematics.

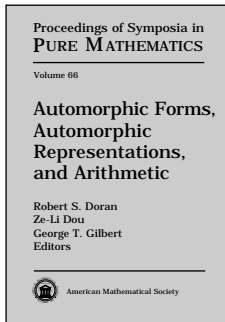
There were 24 talks given by participants in Lie groups, ergodic theory and related fields. Leading mathematicians from around the world attended. Recent developments were presented and a session was devoted to discussion and problems for future research.

This item will also be of interest to those working in analysis. Distributed worldwide except in India and neighboring countries.

Contents: **M. Babilot** and **F. Ledrappier**, Geodesic paths and horocycle flow on Abelian covers; **J. R. Choksi** and **M. G. Nadkarni**, On the question of transformations with simple Lebesgue spectrum; **S. G. Dani** and **C. R. E. Raja**, Asymptotics of measures under group automorphisms and an application to factor sets; **A. Eskin** and **B. Farb**, Quasi-flats in $\mathbb{H}^2 \times \mathbb{H}^2$; **H. Furstenberg**, Stiffness of group actions; **D. Y. Kleinbock**, Bounded orbits conjecture and diophantine approximation; **A. Lubotzky** and **R. J. Zimmer**, A canonical arithmetic quotient for simple Lie group actions; **S. Mozes**, On the congruence subgroup problem for tree lattices; **H. Oh**, Arithmetic properties of some Zariski dense discrete subgroups; **M. Ratner**, On the p-adic and S-arithmetic generalizations of Raghunathan's conjectures; **K. Schmidt**, On the cohomology of algebraic \mathbb{Z}^d -actions with values in compact Lie groups; **N. A. Shah**, Invariant measures and orbit closures on homogeneous spaces; **Y. Shalom**, Random ergodic theorems, invariant means and unitary representation; **G. A. Soifer**, Structure of infinite index maximal subgroups of $SL_n(\mathbb{Z})$; **A. N. Starkov**, Dynamics of non-unipotent homogeneous flows; **W. A. Veech**, Geometric realizations of hyperelliptic curves, II; **D. Witte**, Cocycle superrigidity for ergodic actions of non-semi-simple Lie groups.

Tata Institute of Fundamental Research

December 1998, 386 pages, Hardcover, ISBN 81-7319-235-9, 1991 *Mathematics Subject Classification*: 22-06, 28Dxx; 22D40, 58F11, **All AMS members \$32**, List \$40, Order code TIFR/1N



Automorphic Forms, Automorphic Representations, and Arithmetic

Robert S. Doran, Ze-Li Dou, and George T. Gilbert, *Texas Christian University, Fort Worth*, Editors

Professor Goro Shimura was principal speaker at the conference on "Euler Products and Eisenstein Series" held at Texas Christian University (See *CBMS Regional Conference Series in Mathematics*, Volume 93). The present volume contains articles by leading specialists in the field. Some of these articles are based on talks given at the conference, whereas others were written purposely for this volume. The variety of the work presented reflects the current active state of the topic.

Contents: D. Blasius and M. Borovoi, On period torsors; A. W. Blüher, Near holomorphy, arithmeticity, and the theta correspondence; R. Coleman, B. Kaskel, and K. A. Ribet, Torsion points on $X_0(N)$; P. Feit, A fundamental group for symbolic dynamics. I: Definitions; E. Ghate, Critical values of twisted tensor L -functions over CM-fields; D. Goldfeld, Zeta functions formed with modular symbols; H. Hida, Non-critical values of adjoint L -functions for $SL(2)$; M. R. Murty, Bounds for congruence primes; V. K. Murty, Frobenius distributions and Galois representations; K. Rubin and A. Silverberg, Mod 6 representations of elliptic curves; H. Yoshida, On absolute CM-periods; D. Bump and S. Friedberg, Metaplectic generating functions and Shimura integrals; B. Casselman, On the Plancherel measure for the continuous spectrum of the modular group; D. Farmer, J. Hoffstein, and D. Lieman, Average values of cubic L -series; P. Garrett, Euler factorization of global integrals; M. Harris, Cohomological automorphic forms on unitary groups. I: Rationality of the theta correspondence; B. E. Heim, Pullbacks of Eisenstein series, Hecke-Jacobi theory and automorphic L -functions; J. Hoffstein and P. Lockhart, Omega results for automorphic L -functions; K. Khuri-Makdisi, Representations of $SL(2) \times G$; J. Levy, Truncated integrals and the Shintani zeta function for the space of binary quartic forms; W. Luo, Z. Rudnick, and P. Sarnak, On the generalized Ramanujan conjecture for $GL(n)$; D. Prasad and D. Ramakrishnan, On the global root numbers of $GL(n) \times GL(m)$.

Proceedings of Symposia in Pure Mathematics, Volume 66

Part 1: July 1999, 278 pages, Hardcover, ISBN 0-8218-1050-2, LC 99-28916, 1991 *Mathematics Subject Classification*: 11Fxx; 14Gxx, 22Exx, **Individual member \$38**, List \$63, Institutional member \$50, Order code PSPUM/66.1N

Part 2: July 1999, 330 pages, Hardcover, ISBN 0-8218-1051-0, LC 99-28916, 1991 *Mathematics Subject Classification*: 11Fxx; 14Gxx, 22Exx, **Individual member \$38**, List \$64, Institutional member \$51, Order code PSPUM/66.2N

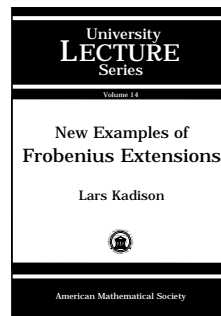
Set: July 1999, 608 pages, Hardcover, ISBN 0-8218-0659-9, LC 99-28916, 1991 *Mathematics Subject Classification*: 11Fxx; 14Gxx, 22Exx, **Individual member \$73**, List \$121, Institutional member \$97, Order code PSPUM/66N

Supplementary Reading

New Examples of Frobenius Extensions

Lars Kadison, *Göteborg University, Sweden*

This volume is based on the author's lecture courses to algebraists at Munich and at Göteborg. He presents, for the first time in book form, a unified approach from the point of view of Frobenius algebras/extensions to diverse topics, such as Jones'



subfactor theory, Hopf algebras and Hopf subalgebras, the Yang-Baxter Equation and 2-dimensional topological quantum field theories.

Other Features:

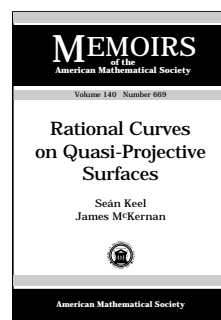
- Initial steps toward a theory of noncommutative ring extensions.
- Self-contained sections on Azumaya algebras and strongly separable algebras.
- Applications and generalizations of Morita theory and Azumaya algebra due to Hirata and Sugano.

Understanding the text requires no prior background in Frobenius algebras or Hopf algebras. An index and a thorough list of further references are included. There is an appendix giving a brief historical guide to the literature.

Contents: Introduction to Frobenius extensions; The endomorphism ring theorem; The Jones polynomial; Frobenius algebras; Azumaya algebras; Hopf algebras over commutative rings; Hopf subalgebras; Historical notes; Bibliography; Index.

University Lecture Series, Volume 14

June 1999, 84 pages, Softcover, ISBN 0-8218-1962-3, LC 99-25462, 1991 *Mathematics Subject Classification*: 16W30, 16L60, 16H05; 46L37, 57M25, 81R50, 81T40, **All AMS members \$18**, List \$22, Order code ULECT/14N



Rational Curves on Quasi-Projective Surfaces

Seán Keel, *University of Texas, Austin*, and James McKernan, *University of California, Santa Barbara*

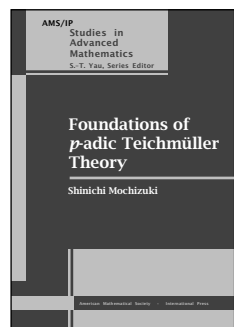
Contents: Introduction and statement of results; Glossary of notation and conventions; Gorenstein del Pezzo

surfaces; Bug-eyed covers; Log deformation theory; Criteria for log uniruledness; Reduction to $\pi_1^{\text{alg}}(S^0) = \{1\}$; Flushness and preparation for the hunt; Bogomolov bound; Riemann Roch and surfaces with small coefficient; A partial classification of K_T -contractions; the linear system $|K_S + A|$; Classification of bananas and fences; T_1 a net; $g(A_1) > 1$; A_1 has a simple cusp; A_1 has a simple node; A_1 smooth; The smooth banana; Proof of (1.1) and corollaries; A surface with $\pi_1^{\text{alg}}(S^0) = \{1\}$ but no tiger; Tigers, complements and toric pairs; Classification of almost all rank one log del Pezzos; Appendix: Log terminal surface singularities and adjunction; Appendix: Normalisation

of an algebraic space; Index to obscure or unconventional notation; References.

Memoirs of the American Mathematical Society, Volume 140, Number 669

May 1999, 153 pages, Softcover, ISBN 0-8218-1096-0, LC 99-14985, 1991 *Mathematics Subject Classification*: 14J26, 14J45, **Individual member \$27**, List \$45, Institutional member \$36, Order code MEMO/140/669N



Foundations of p -adic Teichmüller Theory

Shinichi Mochizuki, *Research Institute for the Mathematical Sciences, Kyoto, Japan*

This book lays the foundation for a theory of *uniformization of p -adic hyperbolic curves and their moduli*. On one hand, this theory generalizes the

Fuchsian and Bers uniformizations of complex hyperbolic curves and their moduli to nonarchimedean places. That is why in this book, the theory is referred to as *p -adic Teichmüller theory*, for short. On the other hand, the theory may be regarded as a fairly precise hyperbolic analog of the Serre-Tate theory of ordinary abelian varieties and their moduli.

The theory of uniformization of p -adic hyperbolic curves and their moduli was initiated in a previous work by Mochizuki. And in some sense, this book is a continuation and generalization of that work. This book aims to bridge the gap between the approach presented and the classical uniformization of a hyperbolic Riemann surface that is studied in undergraduate complex analysis.

Features:

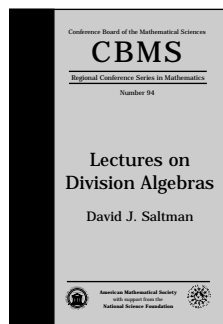
- Presents a systematic treatment of the moduli space of curves from the point of view of p -adic Galois representations.
- Treats the analog of Serre-Tate theory for hyperbolic curves.
- Develops a p -adic analog of Fuchsian and Bers uniformization theories.
- Gives a systematic treatment of a “nonabelian example” of p -adic Hodge theory.

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

Contents: Introduction; Crys-stable bundles; Torally Crys-stable bundles in positive characteristic; VF-patterns; Construction of examples; Combinatorialization at infinity of the stack of nilcurves; The stack of quasi-analytic self-isogenies; The generalized ordinary theory; The geometrization of binary-ordinary Frobenius liftings; The geometrization of spiked Frobenius liftings; Representations of the fundamental group of the curve; Appendix: Ordinary stable bundles on a curve; Bibliography; Index.

AMS/IP Studies in Advanced Mathematics, Volume 11

July 1999, 529 pages, Hardcover, ISBN 0-8218-1190-8, LC 99-26586, 1991 *Mathematics Subject Classification*: 14F30, 14H10, **All AMS members \$47**, List \$59, Order code AMSIP/11N



Lectures on Division Algebras

David J. Saltman, *University of Texas, Austin*

This volume is based on lectures on division algebras given at a conference held at Colorado State University. Although division algebras are a very classical object, this book presents this “classical” material in a new way, highlighting current approaches and

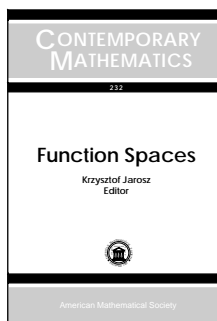
new theorems, and illuminating the connections with a variety of areas in mathematics.

Contents: Introduction; A division algebra is a central simple algebra; Azumaya algebras at the generic point; The Brauer group; Form of matrices; Torsion question; Galois extensions; Crossed products and cohomology; Corestriction; Orders and regular domains; Ramification; Specialization and lifting; Lattice methods; Brauer Severi varieties; Generic division algebra; Bibliography.

CBMS Regional Conference Series in Mathematics, Number 94

June 1999, 120 pages, Softcover, ISBN 0-8218-0979-2, LC 99-25461, 1991 *Mathematics Subject Classification*: 12E15, 16K20, 13A20; 12G05, 14M99, 13A50, 14D25, **All AMS members \$18**, List \$22, Order code CBMS/94N

Analysis



Function Spaces

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

This proceedings volume presents 36 papers given by leading experts during the Third Conference on Function Spaces held at Southern Illinois University at Edwardsville. A wide range of topics in the subject area are covered. Most papers are written for

nonexperts, so the book can serve as a good introduction to the topic for those interested in this area.

The book presents the following broad range of topics, including spaces and algebras of analytic functions of one and of many variables, L^p spaces, spaces of Banach-valued functions, isometries of function spaces, geometry of Banach spaces and related subjects. Known results, open problems, and new discoveries are featured. At the time of publication, information about the book, the conference, and a list and pictures of contributors are available on the Web at www.siu.edu/MATH/conference.htm.

Contents: **M. D. Acosta**, Norm attaining operators in $L_1(\mu)$; **P. Aiena**, The Weyl-Browder spectrum of a multiplier; **J. Akeroyd** and **E. G. Saleeby**, On polynomial approximation in the mean; **J. T. Anderson** and **J. A. Cima**, A uniqueness theorem for normal functions of several complex variables; **J. Araujo** and **K. Jarosz**, Separating maps on spaces of contin-

uous functions; **R. Aron** and **J. Bés**, Hypercyclic differentiation operators; **P. Avramidou** and **F. Jafari**, On norms of composition operators on Hardy spaces; **C. Badea**, Stable ranks, K-groups and Witt groups of some Banach and C^* -algebras; **A. Bernard** and **G. Muraz**, Locally constant almost everywhere Fourier transform; **S. Bernstein**, The quaternionic Riemann problem; **O. Blasco**, Convolution by means of bilinear maps; **C.-H. Chu**, **A. M. Galindo**, and **A. Rodríguez Palacios**, On prime real JB^* -triples; **M. D. Contreras** and **S. Díaz-Madrigal**, Compact-type operators defined on H^∞ ; **S. J. Dilworth**, On the extensibility of certain homeomorphisms and linear isometries; **P. N. Dowling**, The fixed point property for subsets of $L_1[0, 1]$; **J. F. Feinstein** and **D. W. B. Somerset**, Strong regularity for uniform algebras; **R. Gonzalo** and **J. A. Jaramillo**, High order smoothness in sequence spaces and spreading models; **P. Gorkin** and **R. Mortini**, A survey of closed ideals in familiar function algebras; **O. Hatori**, Subalgebras of commutative Banach algebras and Fourier multipliers with natural spectra; **F. Holland** and **R. Rochberg**, Bergman kernels and Hankel forms on generalized Fock spaces; **K. Jarosz**, When is a linear functional multiplicative?; **N. J. Kalton**, A remark on Banach spaces isomorphic to their squares; **S. G. Krantz** and **M. M. Peloso**, Sobolev spaces and projections of holomorphic functions and mappings; **F. León-Saavedra**, Universal functions on the unit ball and the polydisk; **T. Miura**, On commutative C^* -algebras in which every element is almost the square of another; **T. Nakazi**, Some special bounded homomorphisms of a uniform algebra; **M. M. Neumann**, Analytic functional models for operators on Banach spaces; **B. Randrianantoanina**, Injective isometries in Orlicz spaces; **A. Rodríguez-Palacios** and **M. V. Velasco**, Continuity of homomorphisms and derivations on Banach algebras with an involution; **A. G. Siskakis** and **R. Zhao**, A Volterra type operator on spaces of analytic functions; **K. Stroethoff**, Algebraic properties of Toeplitz operators on the Hardy space via the Berezin transform; **H. Takagi** and **K. Yokouchi**, Multiplication and composition operators between two L^p -spaces; **T. Tonev**, Bourgain algebras and inductive limit algebras; **A. Triki**, A note on averaging operators; **K. Watanabe**, Problems on isometries of non-commutative L^p -spaces; **A. Zagorodnyuk**, Multiplicative polynomial operators on topological algebras.

Contemporary Mathematics, Volume 232

June 1999, 361 pages, Softcover, ISBN 0-8218-0939-3, LC 99-13038, 1991 *Mathematics Subject Classification*: 46Exx, 46Jxx, 30-02, 32-02, 46-02, **Individual member \$49**, List \$81, Institutional member \$65, Order code CONM/232N

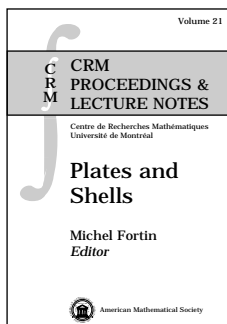
the problem would emerge for both groups of professionals. New aspects from the mathematical point of view and new applications posing new challenges are reported. This volume offers a snapshot of the state of the art of this rapidly evolving topic.

Contents: **S. M. Alessandrini**, **D. N. Arnold**, **R. S. Falk**, and **A. L. Madureira**, Derivation and justification of plate models by variational methods; **J.-L. Batoz**, **Y. Q. Guo**, and **F. Mercier**, Simple triangular shell elements for large strain estimations of sheet metal forming parts; **M. Bernadou**, Some approximation methods for linear thin shell problems; **M. Bernadou** and **C. Haenel**, Numerical analysis of piezoelectric shells; **M. Carrive** and **P. Le Tallec**, Étude intrinsèque d'un problème de coque en grandes déformations; **D. Chapelle** and **R. Stenberg**, Locking-free mixed stabilized finite element methods for bending-dominated shells; **F. Dammak**, **S. Chamlal**, **A. Gakwaya**, and **G. Dhatt**, Un élément de coque simple à trois nœuds en grandes rotations et élastoplasticité; **M. C. Delfour** and **J. Zhao**, Intrinsic nonlinear models of shells; **M. C. Delfour** and **J.-P. Zolésio**, Convergence of the linear $P(1,1)$ and $P(2,1)$ thin shells to asymptotic shells; **Q. Deng** and **X. Feng**, Two-level overlapping Schwarz methods for plate elements on unstructured meshes using non-matching coarse grids; **J.-C. Gelin** and **L. Boubakar**, Large elasto-plastic deformations of thin shells with application to the stamping of anisotropic sheet metal parts; **K. Genevey**, Justification of two-dimensional linear shell models by the use of Γ -convergence theory; **S. F. Golovashchenko** and **N. M. Bessonov**, Numerical simulation of high-rate stamping of tubes and sheets; **A. Ibrahimbegović**, An intrinsic form of the stress resultant geometrically exact shell theory; **A. Iosilevich**, **K.-J. Bathe**, and **F. Brezzi**, Numerical inf-sup analysis of MITC plate bending elements; **E. Pagnacco** and **J. E. Souza de Cursi**, Optimisation des plaques et coques; **M. A. Tournour** and **N. Atalla**, Vibroacoustic behavior of a rectangular box; **G. Yang**, **M. C. Delfour**, and **M. Fortin**, Error analysis of mixed finite elements for cylindrical shells.

CRM Proceedings & Lecture Notes, Volume 21

May 1999, 280 pages, Softcover, ISBN 0-8218-0950-4, LC 99-22844, 1991 *Mathematics Subject Classification*: 73Kxx; 65-XX, **Individual member \$45**, List \$75, Institutional member \$60, Order code CRMP/21N

Applications

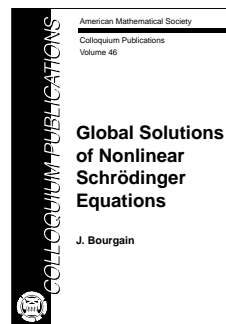


Plates and Shells

Michel Fortin, *Université Laval, Ste-Foy, PQ, Canada*, Editor

This volume features the proceedings from the Summer Seminar of the Canadian Mathematical Society held at Université Laval. The purpose of the seminar was to gather both mathematicians and engineers interested in the theory or application of plates and

shells, or more generally, in the modelisation of thin structures. From this, it was hoped that a better understanding of



Global Solutions of Nonlinear Schrödinger Equations

J. Bourgain, *Institute for Advanced Study, Princeton, NJ*

This volume presents recent progress in the theory of nonlinear dispersive equations, primarily the nonlinear

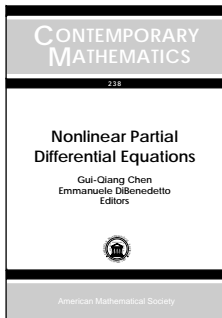
Schrödinger (NLS) equation. The Cauchy problem for defocusing NLS with critical nonlinearity is discussed. New techniques and results are described on global existence and properties of solutions with Large Cauchy data. Current research in harmonic analysis around Strichartz's inequalities and its relevance to nonlinear PDE is presented. Several topics

in NLS theory on bounded domains are reviewed. Using the NLS as an example, the book offers comprehensive insight on current research related to dispersive equations and Hamiltonian PDEs.

Contents: Introduction and summary; An overview of results on the Cauchy problem for NLS; Further comments; 3D H^1 -critical defocusing NLS; Global wellposedness below energy norm; Nonlinear Schrödinger equation with periodic boundary conditions; Appendix 1: Growth of Sobolev norms in linear Schrödinger equations with smooth time dependent potential; Appendix 2: Zakharov systems; References; Index.

Colloquium Publications, Volume 46

July 1999, 182 pages, Hardcover, ISBN 0-8218-1919-4, LC 99-13066, 1991 *Mathematics Subject Classification:* 35Q55, **Individual member \$21**, List \$35, Institutional member \$28, Order code COLL/46N



Nonlinear Partial Differential Equations

Gui-Qiang Chen and Emmanuele DiBenedetto, Northwestern University, Evanston, IL, Editors

This volume is a collection of original research papers and expository articles stemming from the scientific

program of the Nonlinear PDE Emphasis Year held at Northwestern University (Evanston, IL). The book offers a cross-section of the most significant recent advances and current trends and directions in nonlinear partial differential equations and related topics.

The book's contributions offer two perspectives. There are papers on general analytical treatment of the theory and papers on computational methods and applications originating from significant realistic mathematical models of natural phenomena. Also included are articles that bridge the gap between these two perspectives, seeking synergistic links between theory and modeling and computation. The volume offers direct insight into recent trends in PDEs.

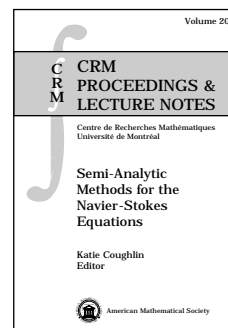
This volume is also available on the Web. Those who purchase the print edition gain free access. Go to www.ams.org/conm/.

Contents: P. Baiti, P. G. LeFloch, and B. Piccoli, Nonclassical shocks and the Cauchy problem: General conservation laws; L. A. Caffarelli, The Harnack inequality and non-divergence equations; G.-Q. Chen and H. Frid, Vanishing viscosity limit for initial-boundary value problems for conservation laws; A. J. Chorin, A. P. Kast, and R. Kupferman, On the prediction of large-scale dynamics using unresolved computations; P. Constantin, Variational bounds in turbulent convection; B. Dacorogna and P. Marcellini, On the solvability of implicit nonlinear systems in the vectorial case; C. M. Dafermos, Genuinely nonlinear hyperbolic systems of two conservation laws; I. M. Gamba, Milne problem for strong force scaling; J. Glimm, J. W. Grove, X. L. Li, and N. Zhao, Simple front tracking; Y. Guo and A. S. Tahvildar-Zadeh, Formation of singularities in relativistic fluid dynamics and in spherically symmetric plasma dynamics; C. Lattanzio and P. Marcati, Asymptotic stability of plane diffusion waves for the 2-D quasilinear wave equation; T.-P. Liu and T. Yang, L_1 stability for systems of hyperbolic conservation laws; T. Ma and S. Wang, The geometry of the stream lines of steady states of

the Navier-Stokes equations; R. Magnanini and G. Talenti, On complex-valued solutions to a 2D eikonal equation. Part one: Qualitative properties; U. F. Mayer and G. Simonett, On diffusion-induced grain-boundary motion; M. O'Leary, Local estimates for solutions to singular and degenerate quasilinear parabolic equations; D. Peng, S. Osher, B. Merriman, and H.-K. Zhao, The geometry of Wulff crystal shapes and its relations with Riemann problems.

Contemporary Mathematics

August 1999, approximately 320 pages, Softcover, ISBN 0-8218-1196-7, LC 99-30749, 1991 *Mathematics Subject Classification:* 35-06, 35-02; 35J60, 35K55, 35L65, 65Mxx, 76N10, **Individual member \$36**, List \$60, Institutional member \$48, Order code CONM-CHENN
Electronic only: ISBN 0-8218-2034-6, **Individual member \$32**, List \$54, Institutional member \$43, Order code CONM-CHEN.EN



Semi-Analytic Methods for the Navier-Stokes Equations

Katie Coughlin, University of Montreal, PQ, Canada, Editor

The lectures collected for this volume were given during a workshop entitled "Semi-analytic Methods for the Navier Stokes Equations", held at the CRM in

Montréal. The title reflects the current reality in fluid dynamics: the Navier-Stokes equations (NSE) describe the behavior of fluid in a wide range of physical situations, the solutions of these equations are sufficiently complicated, so that another level of analysis is clearly needed. The fundamental problem is not just to solve the NSE, but also to understand what the solutions mean.

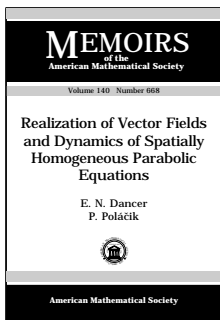
One of the goals of the workshop was to bring together people who, while working in different fields, share a common perspective on the nature of the problem to be solved. The lectures present a diverse set of techniques for modelling, computing, and understanding phenomena such as instabilities, turbulence and spatiotemporal chaos in fluids.

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

Contents: E. S. C. Ching, Probabilities and conditional averages in turbulence; H. S. Greenside, Spatiotemporal chaos in large systems: The scaling of complexity with size; M. Kirby and R. Miranda, Empirical dynamical system reduction I: Global nonlinear transformations; D. R. Hundley, M. Kirby, and R. Miranda, Empirical dynamical system reduction II: Neural charts; C. Lee and P. S. Marcus, Asymmetries in eastward and westward jets in a model planetary atmosphere; C. Meneveau and T. S. Lund, Lagrangian averaging for dynamic Eddy-viscosity subgrid models for filtered Navier-Stokes equation; J. B. Weiss, Punctuated Hamiltonian models of structured turbulence.

CRM Proceedings & Lecture Notes, Volume 20

April 1999, 119 pages, Softcover, ISBN 0-8218-0878-8, LC 99-14403, 1991 *Mathematics Subject Classification:* 76-06; 76D05, **Individual member \$23**, List \$39, Institutional member \$31, Order code CRMP/20N



Realization of Vector Fields and Dynamics of Spatially Homogeneous Parabolic Equations

E. N. Dancer, *University of Sydney, NSW, Australia*, and P. Poláčik, *Comenius University, Bratislava, Slovak Republic*

Contents: Introduction; Main results; The center manifold reduction; Center manifolds of (1.1), (1.2); The algebraic independence condition; Perturbation of the domain; A selection of eigenfunctions in high-dimensional eigenspaces; Eigenfunctions with separable variables; Completion of proofs; References.

Memoirs of the American Mathematical Society, Volume 140, Number 668

May 1999, 82 pages, Softcover, ISBN 0-8218-1182-7, LC 99-14984, 1991 *Mathematics Subject Classification*: 35K55, 35K57, 35B40; 35J25, 35P05, 58F13, **Individual member \$23**, List \$39, Institutional member \$31, Order code MEMO/140/668N

An Introduction to the Mathematical Theory of Waves

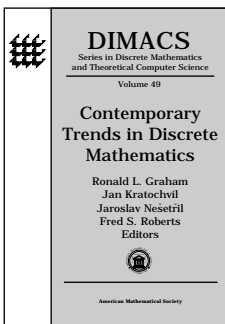
Roger A. Knobel, *University of Texas-Pan American, Edinburg*

See page 716 for a full description of this volume.

Student Mathematical Library

October 1999 (estimated), approximately 200 pages, Softcover, ISBN 0-8218-2039-7, **All AMS members \$18**, List \$23, Order code STML-KNOBELN

Discrete Mathematics and Combinatorics



Contemporary Trends in Discrete Mathematics From DIMACS and DIMATIA to the Future

Ronald L. Graham, *AT&T Labs—Research, Florham Park, NJ*, Jan Kratochvíl and Jaroslav Nešetřil, *DIMATIA,*

Charles University, Prague, Czech Republic, and Fred S. Roberts, *DIMACS, Rutgers University, Piscataway, NJ*, Editors

Discrete mathematics stands among the leading disciplines of mathematics and theoretical computer science. This is due

primarily to its increasing role in university curricula and its growing importance in applications ranging from optimization to molecular biology. An inaugural conference was held cooperatively by DIMATIA and DIMACS to focus on the versatility, width, and depth of current progress in the subject area.

This volume offers a well-balanced blend of research and survey papers reflecting the exciting, attractive topics in contemporary discrete mathematics. Discussed in the book are topics such as graph theory, partially ordered sets, geometrical Ramsey theory, computational complexity issues and applications.

Contents: P. Boiron, E. Sopena, and L. Vignal, Acyclic improper colourings of graphs with bounded degree; P. Ossona de Mendez and H. de Fraysseix, Intersection graphs of Jordan arcs; J. Díaz, M. Serna, and P. Spirakis, Linear and nonlinear systems: A survey; R. G. Downey, M. R. Fellows, and U. Stege, Parameterized complexity: A framework for systematically confronting computational intractability; G. Elekes, On the structure of large homothetic subsets; S. P. Fekete, W. Hochstättler, S. Kromberg, and C. Moll, The complexity of an inverse shortest paths problem; A. Frank, Finding minimum weighted generators of a path system; J. R. Griggs and G. Rote, On the distribution of sums of vectors in general position; A. Gupta, D. Kaller, S. Mahajan, and T. Shermer, The generalized matching problem on partial k -trees; W. Hochstättler and M. Loeb, Bases of cycle lattices and submatrices of a Hadamard matrix; M. Klazar, On the maximum lengths of Davenport-Schinzel sequences; A. V. Kostochka, T. Luczak, G. Simonyi, and E. Sopena, On the minimum number of edges giving maximum oriented chromatic number; J. Kratochvíl, Zs. Tuza, and M. Voigt, New trends in the theory of graph colorings: Choosability and list coloring; W. Mader, Topological minors in graphs of minimum degree n ; P. Mihók, Reducible properties and uniquely partitionable graphs; J. Nešetřil, J. Solymosi, and P. Valtr, Induced monochromatic subconfigurations; J. Nešetřil and C. Tardif, Density; P. Pančoška, V. Janota, and J. Nešetřil, Spectra, graphs, and proteins. Towards understanding of protein folding; F. S. Roberts, Meaningless statements; M. Rosenfeld, Graceful matchings in finite fields, the factor-difference sets of integers, and integers of the form $a^2 + kb^2$; M. Simonovits, How to solve a Turán type extremal graph problem? (Linear decomposition); A. Salí and G. Simonyi, Oriented list colouring of undirected graphs; J. Spencer and L. Thoma, On the limit values of probabilities for the first order properties of graphs; W. T. Trotter, Ramsey theory and partially ordered sets; P. Valtr, Generalizations of Davenport-Schinzel sequences.

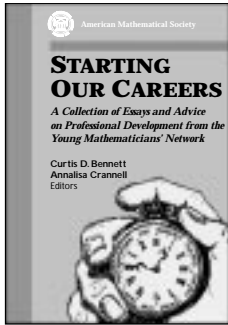
DIMACS: Series in Discrete Mathematics and Theoretical Computer Science, Volume 49

May 1999, 389 pages, Hardcover, ISBN 0-8218-0963-6, LC 99-19657, 1991 *Mathematics Subject Classification*: 05-06, 05Cxx, 05Dxx, 06A07, 11Bxx, 60C05, 68Rxx, 68Q15, 92C40, **Individual member \$54**, List \$90, Institutional member \$72, Order code DIMACS/49N

General and Interdisciplinary

Back in print from the AMS

A Classic



Starting Our Careers A Collection of Essays and Advice on Professional Development from the Young Mathematicians' Network

Curtis D. Bennett, *Bowling Green State University, OH,*
and Annalisa Crannell,

Franklin & Marshall College, Lancaster, PA, Editors

If you are the reader we envision for this book, you have just passed through the most crucial stage of your career—writing and defending your doctoral thesis in mathematics—only to discover what lies ahead is, yet again, the most crucial stage of your career: making the choice about what job to take ... It is the time when you make the adjustment from studying in a research institution to earning your keep in industry or academia ... It is the time when you will or will not publish your thesis ... when you will decide to leave research behind or to start new mathematics independently ... or when you will struggle to balance time for students and committees with time in the library ... This book was written largely by people like you ...

—from the Introduction

This “how-to” book addresses all aspects of a young mathematician’s early career development: How do I get good letters of recommendation? How do I apply for a grant? How do I do research in a small department that has no one in my field? How do I do anything meaningful if all I can get is a series of one-year jobs?

These articles paint a broad portrait of current professional development issues of interest from the Young Mathematicians’ Network—from finding jobs to organizing special sessions. There are chapters on applying for positions, working in industry and in academia, starting and publishing research, writing grant proposals, applying for tenure, and becoming involved in the academic community. The book offers timely and sound advice offered by recent doctorates through experienced mathematicians. The material originally appeared in the electronic pages of *Concerns of Young Mathematicians*. The book is devoted exclusively to the early stages of a mathematical career.

Contents: Applying for jobs; Industrial mathematics; Life in small schools; Doing research; What to do with your research once you’ve done it; Getting grants; Tenure; The active mathematical community; Epilogue: A pep-talk; List of authors; Index.

June 1999, 116 pages, Softcover, ISBN 0-8218-1543-1, LC 99-14350, 1991 *Mathematics Subject Classification*: 00A35; 00A06, **Individual member \$14**, List \$24, Institutional member \$19, Order code SOCN

Geometry and the Imagination

D. Hilbert and S. Cohn-Vossen

A fascinating tour of the 20th century mathematical zoo ... Anyone who would like to see proof of the fact that a sphere with a hole can always be bent (no matter how small the hole), learn the theorems about Klein’s bottle—a bottle with no edges, no inside, and no outside—and meet other strange creatures of modern geometry will be delighted with Hilbert and Cohn-Vossen’s book.

—*Scientific American*

Should provide stimulus and inspiration to every student and teacher of geometry.

—*Nature*

A mathematical classic ... The purpose is to make the reader see and feel the proofs ... readers can penetrate into higher mathematics with ... pleasure instead of the usual laborious study.

—*Scientific American*

Students, particularly, would benefit very much by reading this book ... they will experience the sensation of being taken into the friendly confidence of a great mathematician and being shown the real significance of things.

—*Science Progress*

A person with a minimum of formal training can follow the reasoning ... an important [book].

—*Mathematics Teacher*

This remarkable book has endured as a true masterpiece of mathematical exposition. There are few mathematics books that are still so widely read and continue to have so much to offer—even after more than half a century has passed! The book is overflowing with mathematical ideas, which are always explained clearly and elegantly, and above all, with penetrating insight. It is a joy to read, both for beginners and experienced mathematicians.

“Hilbert and Cohn-Vossen” is full of interesting facts, many of which you wish you had known before. It’s also likely that you have heard those facts before, but surely wondered *where* they could be found. The book begins with examples of the simplest curves and surfaces, including thread constructions of certain quadrics and other surfaces. The chapter on regular systems of points leads to the crystallographic groups and the regular polyhedra in \mathbb{R}^3 . In this chapter, they also discuss plane lattices. By considering unit lattices, and throwing in a small amount of number theory when necessary, they effortlessly derive Leibniz’s series: $\pi/4 = 1 - 1/3 + 1/5 - 1/7 + \dots$. In the section on lattices in three and more dimensions, the authors consider sphere-packing problems, including the famous Kepler problem.

One of the most remarkable chapters is “Projective Configurations”. In a short introductory section, Hilbert and Cohn-Vossen give perhaps the most concise and lucid description of *why* a general geometer would care about projective geometry and why such an ostensibly plain setup is truly rich in structure and ideas. Here, we see regular polyhedra again, from a different perspective. One of the high points of the chapter is the discussion of Schlafli’s Double-Six, which leads to the description of the 27 lines on the general smooth cubic surface. As is true throughout the book, the magnificent drawings in this chapter immeasurably help the reader.

A particularly intriguing section in the chapter on differential geometry is *Eleven Properties of the Sphere*. Which eleven properties of such a ubiquitous mathematical object caught their discerning eye and why? Many mathematicians are familiar with the plaster models of surfaces found in many mathematics departments. The book includes pictures of some of the models that are found in the Göttingen collection. Furthermore, the mysterious lines that mark these surfaces are finally explained!

The chapter on kinematics includes a nice discussion of linkages and the geometry of configurations of points and rods that are connected and, perhaps, constrained in some way. This topic in geometry has become increasingly important in recent times, especially in applications to robotics. This is another example of a simple situation that leads to a rich geometry.

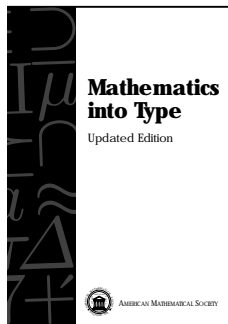
It would be hard to overestimate the continuing influence Hilbert-Cohn-Vossen's book has had on mathematicians of this century. It surely belongs in the "pantheon" of great mathematics books.

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

Contents: The simplest curves and surfaces; Regular systems of points; Projective configurations; Differential geometry; Kinematics; Topology; Index.

AMS Chelsea Publishing

May 1999, 357 pages, Hardcover, ISBN 0-8218-1998-4, LC 52-2894, 1991 *Mathematics Subject Classification*: 00A05, 01A75, All AMS members \$26, List \$29, Order code CHEL/87.HN



Mathematics into Type Updated Edition

**Ellen Swanson, Director of
AMS Editorial Services (Retired)**

This edition, updated by Arlene O'Sean and Antoinette Schleyer of the American Mathematical Society, brings Ms. Swanson's work up to date, reflecting the more technical reality of

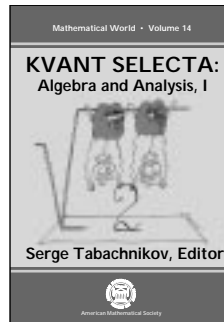
publishing today. While it includes information for copy editors, proofreaders, and production staff to do a thorough, traditional copyediting and proofreading of a manuscript and proof copy, it is increasingly more useful to authors, who have become intricately involved with the typesetting of their manuscripts.

Features:

- Maintains the same user-friendly presentation as the original work.
- Serves as a training tool for newcomers to mathematical publishing.
- Includes a glossary.

Contents: Especially for authors; How to mark mathematical manuscripts; Mathematics in print; Techniques of handling manuscript and proof; Processing a publication in mathematics; Publication style; Trends; Appendixes; Glossary; Bibliography; Index.

May 1999, 102 pages, Softcover, ISBN 0-8218-1961-5, LC 99-25448, 1991 *Mathematics Subject Classification*: 00A20; 00A99, Individual member \$14, List \$24, Institutional member \$19, Order code MIT/2N

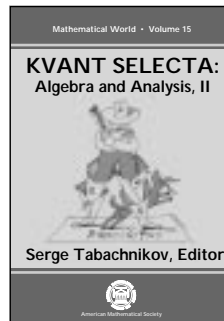


Kvant Selecta Algebra and Analysis, I and II

**Serge Tabachnikov, University
of Arkansas at Fayetteville,
Editor**

These volumes are the first volumes of articles published from 1970 to 1990 in the Russian journal, *Kvant*. The influence of this magazine on mathematics and physics education in Russia is unmatched. This collection represents the Russian tradition of expository mathematical writing at its best.

Articles selected for these two volumes are written by leading Russian mathematicians and expositors. Some articles contain classical mathematical gems still used in university curricula today. Others feature cutting-edge research from the 20th Century.



The articles in these books are written so as to present genuine mathematics in a conceptual, entertaining, and accessible way. The volumes are designed to be used by students and teachers who love mathematics and want to study its various aspects, thus deepening and expanding the school curriculum.

The articles in the first volume are mainly devoted to various topics in number theory, whereas the second volume treats diverse aspects of analysis and algebra.

Cover art created by Sergei Ivanov. Used with permission.

Contents (Preliminary). *Volume I:* **D. B. Fuchs** and **M. B. Fuchs**, The arithmetic of binomial coefficients; **M. I. Bashmakov**, Do you like messing around with integers?; **M. I. Bashmakov**, On Bertrand's conjecture; **D. B. Fuchs** and **M. B. Fuchs**, On best approximations. I; **D. B. Fuchs** and **M. B. Fuchs**, On best approximations. II; **A. I. Shirshov**, On a certain property of binomial coefficients; **L. G. Limanov**, On $n!$ and the number e (Several approaches to a certain problem); **D. B. Fuchs** and **M. B. Fuchs**, Rational approximations and transcendence; **V. N. Vaguten**, Close fractions; **A. I. Shirshov**, On the equation $\binom{n}{m} = \binom{n+1}{m-1}$; **A. Kirillov**, On regular polygons, Euler's function, and Fermat numbers; **B. Bekker**, **S. Vostokov**, and **Yu. Ionin**, 2-adic numbers; **E. Kuzmin** and **A. Shirshov**, On the number e ; **M. G. Krein**, Markov's Diophantine equation; **A. B. Goncharov**, The arithmetic of Gaussian integers; **V. S. Shevelev**, Three formulas of Ramanujan; **V. G. Stolyar**, **E. A. Kuraev**, **Z. K. Silogadze**, **G. A. Galperin**, and **A. V. Korlyukov**, Amazing adventures in the land of repeating decimals. *Volume II:* **V. N. Vaguten**, Binomial coefficients, polynomials, and sequences (Several approaches to a certain problem); **Yu. V. Matiyasevich**, Formulas for prime numbers; **B. Martynov**, Fermat's theorem for polynomials; **I. Yantarov**, Commuting polynomials; **D. B. Fuchs**, On the removal of parentheses, on Euler, Gauss, and Macdonald, and on missed opportunities; **N. Vassiliev** and **A. Zelevinskii**, Chebyshev polynomials and recurrence relations; **O. V. Lyashko**, Why resistance does not decrease; **V. I. Arnold**, Evolution processes and ordinary differential equations; **V. A. Oleinikov**, Irrationality and irreducibility; **V. A. Oleinikov**, Irreducibility and

irrationality; **Yu. P. Solov'ev**, The arithmetic of elliptic curves; **N. B. Vassiliev**, Pascal's hexagrams and cubic curves; **V. I. Arnold**, Kepler's second law and the topology of abelian integrals (According to Newton); **F. V. Vainstein**, Partitions of integers; **V. Yu. Ovsienko**, On the Denogardus great number and Hooke's law; **S. Tabachnikov**, Polynomials having least deviation from zero.

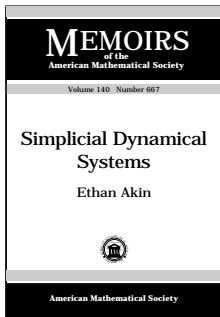
Mathematical World, Volume 14 and Volume 15

I: August 1999, 155 pages, Softcover, ISBN 0-8218-1002-2, 1991 *Mathematics Subject Classification:* 00-01, 00A08,

All AMS members \$19, List \$24, Order code MAWRDL/14N

II: August 1999, approximately 159 pages, Softcover, ISBN 0-8218-1915-1, 1991 *Mathematics Subject Classification:* 00-01, 00A08, **All AMS members \$19**, List \$24, Order code MAWRDL/15N

Geometry and Topology



Simplicial Dynamical Systems

Ethan Akin, *City College (CUNY), New York*

Contents: Introduction; Chain recurrence and basic sets; Simplicial maps and their local inverses; The shift factor maps for a simplicial dynamical system; Recurrence and basic set images; Invariant measures; Generalized simplicial dynamical systems;

Examples; PL roundoffs of a continuous map; Nondegenerate maps on manifolds; Appendix: Stellar and lunar subdivisions; Appendix: Hyperbolicity for relations; References; Index.

Memoirs of the American Mathematical Society, Volume 140, Number 667

May 1999, 197 pages, Softcover, ISBN 0-8218-1383-8, LC 99-14982, 1991 *Mathematics Subject Classification:* 54H20, 58F10, 34C35, **Individual member \$29**, List \$49, Institutional member \$39, Order code MEMO/140/667N

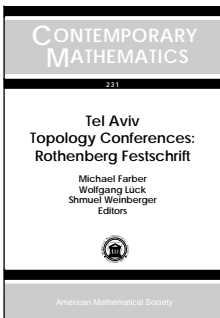
work on triangulations to numerous papers on transformation groups and on geometric and analytic aspects of torsion theory. Current research related to those contributions are reported in this book.

Coverage is included on the following topics: vanishing theorems for the Dirac operator, the theory of Reidemeister torsion (including infinite dimensional flat bundles), Nobikov-Shubin invariants of manifolds, topology of group actions, Lusternik-Schnirelman theory for closed 1-forms, finite type invariants of links and 3-manifolds, equivariant cobordisms, equivariant orientations and Thom isomorphisms, and more.

Contents: **M. Braverman**, Vanishing theorems on covering manifolds; **R. Brooks**, The Sunada method; **D. Burghel**, **L. Friedlander**, and **T. Kappeler**, Relative torsion for homotopy triangulations; **S. Cappell** and **J. Shaneson**, Nonlinear similarity and linear similarity are equivariant below dimension 6; **M. Farber**, Massey products and critical points; **M. Farber** and **V. Turaev**, Absolute torsion; **S. Garoufalidis**, Signatures of links and finite type invariants of cyclic branched covers; **V. L. Ginzburg**, **V. L. Guillemin**, and **Y. Karshon**, The relation between compact and non-compact equivariant cobordisms; **M. G. Katz** and **A. I. Suci**, Volume of Riemannian manifolds, geometric inequalities, and homotopy theory; **J. Levine**, Pure braids, a new subgroup of the mapping class group and finite-type invariants of 3-manifolds; **W. Lück**, **H. Reich**, and **T. Schick**, Novikov-Shubin invariants for arbitrary group actions and their positivity; **M. Markl** and **S. Shnider**, Differential operator endomorphisms of an Euler-Lagrange complex; **V. Mathai**, K-theory of twisted group C^* -algebras and positive scalar curvature; **J. P. May**, Equivariant orientations and Thom isomorphisms; **A. Nabutovsky** and **S. Weinberger**, Algorithmic aspects of homeomorphism problems; **J. Rosenberg**, The G -signature theorem revisited; **M. Shubin**, A sequence of connections and a characterization of Kähler manifolds; **M. Teicher**, New invariants for surfaces; **G. Triantafillou**, The arithmeticity of groups of automorphisms of spaces; **S. Weinberger**, Nonlinear averaging, embeddings, and group actions; **S. Weinberger**, Higher ρ -invariants.

Contemporary Mathematics, Volume 231

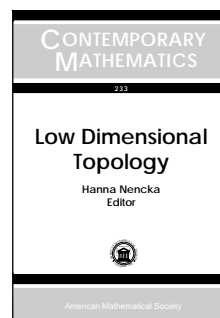
June 1999, 320 pages, Softcover, ISBN 0-8218-1362-5, LC 99-13037, 1991 *Mathematics Subject Classification:* 55-XX, 57-XX, **Individual member \$43**, List \$71, Institutional member \$57, Order code CONM/231N



Tel Aviv Topology Conference: Rothenberg Festschrift

Michael Farber, *Tel Aviv University, Israel*,
Wolfgang Lück, *Westfälische Wilhelms University, Munster, Germany*, and
Shmuel Weinberger,
University of Chicago, IL, Editors

This volume presents the proceedings of the Tel Aviv International Topology Conference held during the Special Topology Program at Tel Aviv University. The book is dedicated to Professor Mel Rothenberg on the occasion of his 65th birthday. His contributions to topology are well known—from the early



Low Dimensional Topology

Hanna Nencka, *University of Madeira, Funchal, Madeira, Portugal*, Editor

This volume presents the proceedings from the conference on low dimensional topology held at the University of Madeira (Portugal). The event was attended by leading scientists in the field from the U.S., Asia, and Europe.

The book has two main parts. The first is devoted to the Poincaré conjecture, characterizations of PL-manifolds, covering quadratic forms of links and to categories in low dimensional topology that appear in connection with conformal and quantum field theory. The second part of the volume covers topological quantum field theory and polynomial invariants for rational homology 3-spheres, derived from the quantum $SU(2)$ -

invariants associated with the first cohomology class modulo two, knot theory, and braid groups. This collection reflects development and progress in the field and presents interesting and new results.

Contents: V. Poénaru, π_1^∞ and infinite simple homotopy type in dimension 3; L. Funar, Cubulations mod bubble moves; I. Bobtcheva and F. Quinn, Numerical presentations of tortile categories; I. Bobtcheva, On Quinn's invariants of 2-dimensional CW-complexes; A. Kawachi, The quadratic form of a link; H. Murakami, Quantum $SU(2)$ -invariants of three-manifolds associated with the trivial first cohomology class modulo two; G. Masbaum, An element of infinite order in TQFT-representations of mapping class groups; T. Ohtsuki, The perturbative $SO(3)$ invariant of homology circles; A. S. Cattaneo, Configuration space integrals and invariants for 3-manifolds and knots; H. R. Morton, The multivariable Alexander polynomial for a closed braid; K. Kobayashi, Boundary links and h-split links; K. Habiro, T. Kanenobu, and A. Shima, Finite type invariants of ribbon 2-knots; S. Kamada, Arrangement of Markov moves for 2-dimensional braids; P. Traczyk, A criterion for signed unknotting number; H. Niencka, On some extensions of Artin's braid relations; J. O'Hara, Asymptotic behavior of energy of polygonal knots.

Contemporary Mathematics, Volume 233

June 1999, 251 pages, Softcover, ISBN 0-8218-0884-2, LC 99-14986, 1991 *Mathematics Subject Classification*: 57Mxx, 57Nxx, 57Pxx, 57Qxx, 57Rxx, 57Sxx, 57Txx, **Individual member \$34**, List \$56, Institutional member \$45, Order code CONM/233N

Supplementary Reading

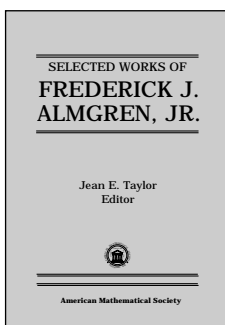
Miles of Tiles

Charles Radin, *University of Texas, Austin*

See page 717 for a full description of this volume.

Student Mathematical Library, Volume 1

July 1999, approximately 128 pages, Softcover, ISBN 0-8218-1933-X, LC 99-20662, 1991 *Mathematics Subject Classification*: 52C22; 58F11, 47A35, 82D25, 20H15, **All AMS members \$13**, List \$16, Order code STML/1N



Selected Works of Frederick J. Almgren, Jr.

Jean E. Taylor, *Rutgers University, New Brunswick, NJ*, Editor

This volume offers a unique collection of some of the work of Frederick J. Almgren, Jr., the man most noted for defining the shape of geometric varia-

tional problems and for his role in founding The Geometry Center. Included in the volume are the following: a summary by Sheldon Chang of the famous 1700 page paper on singular sets of area-minimizing m -dimensional surfaces in \mathbb{R}^n , a detailed summary by Brian White of Almgren's contributions to mathematics, his own announcements of several longer papers, important shorter papers, and memorable expository papers.

Almgren's enthusiasm for the subject and his ability to locate mathematically beautiful problems that were "ready to be solved" attracted many students who further expanded the subject into new areas. Many of these former students are now known for the clarity of their expositions and for the beauty of the problems that they work on. As Almgren's former graduate student, wife, and colleague, Professor Taylor has compiled an important volume on an extraordinary mathematician. This collection presents a fine comprehensive view of the man's mathematical legacy.

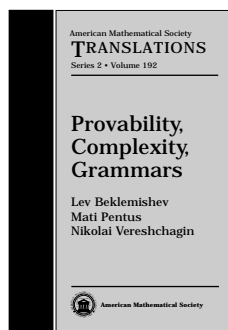
This item will also be of interest to those working in analysis.

Contents: B. White, The mathematics of F. J. Almgren, Jr.; S. X. Chang, On Almgren's regularity result; The homotopy groups of the integral cycle groups; An isoperimetric inequality; Three theorems on manifolds with bounded mean curvature; Existence and regularity almost everywhere of solutions to elliptic variational problems among surfaces of varying topological type and singularity structure; Measure theoretic geometry and elliptic variational problems; The structure of limit varifolds associated with minimizing sequences of mappings; Existence and regularity almost everywhere of solutions to elliptic variational problems with constraints; (with W. K. Allard), The structure of stationary one dimensional varifolds with positive density; (with J. E. Taylor), The geometry of soap films and soap bubbles; (with W. P. Thurston), Examples of unknotted curves which bound only surfaces of high genus within their convex hulls; (with R. Schoen and L. Simon), Regularity and singularity estimates on hypersurfaces minimizing parametric elliptic variational integrals; Dirichlet's problem for multiple valued functions and the regularity of mass minimizing integral currents; (with R. N. Thurston), Liquid crystals and geodesics; Q valued functions minimizing Dirichlet's integral and the regularity of area minimizing rectifiable currents up to codimension two; Optimal isoperimetric inequalities; (with W. Browder and E. Lieb), Co-area, liquid crystals, and minimal surfaces; (with E. H. Lieb), Singularities of energy minimizing maps from the ball to the sphere: Examples, counterexamples, and bounds; (with E. H. Lieb), Symmetric decreasing rearrangement is sometimes continuous; Questions and answers about area-minimizing surfaces and geometric measure theory; (with J. E. Taylor and L. Wang), Curvature-driven flows: A variational approach; Questions and answers about geometric evolution processes and crystal growth.

Collected Works, Volume 13

August 1999, 586 pages, Hardcover, ISBN 0-8218-1067-7, LC 99-13039, 1991 *Mathematics Subject Classification*: 49F20, 49F22, **Individual member \$63**, List \$105, Institutional member \$84, Order code CWORKS/13N

Logic and Foundations



Provability, Complexity, Grammars

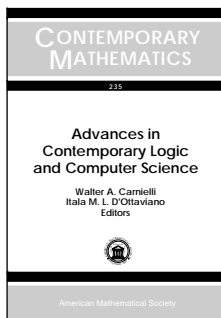
Lev Beklemishev, *Steklov Institute of Mathematics, Moscow, Russia*, and Mati Pentus and Nikolai Vereshchagin, *Moscow State University, Russia*

The book contains English translations of three outstanding dissertations in mathematical logic and complexity theory. L. Beklemishev proves that all provability logics must belong to one of the four previously known classes. The dissertation of M. Pentus proves the Chomsky conjecture about the equivalence of two approaches to formal languages: the Chomsky hierarchy and the Lambek calculus. The dissertation of N. Vereshchagin describes a general framework for criteria of reversability in complexity theory.

Contents: L. D. Beklemishev, Classification of propositional provability logics; M. Pentus, Lambek calculus and formal grammars; N. K. Vereshchagin, Relativizability in complexity theory.

American Mathematical Society Translations—Series 2, Volume 192

May 1999, 172 pages, Hardcover, ISBN 0-8218-1078-2, LC 99-20177, 1991 *Mathematics Subject Classification*: 68Q15, 68S05, 03B45; 03B65, 03F40, **Individual member \$53**, List \$89, Institutional member \$71, Order code TRANS2/192N



Advances in Contemporary Logic and Computer Science

Walter A. Carnielli and Itala M. L. D'Ottaviano, *State University of Campinas, São Paulo, Brazil*, Editors

This volume presents the proceedings from the Eleventh Brazilian Logic Conference on Mathematical Logic held by the Brazilian Logic Society (co-sponsored by the Centre for Logic, Epistemology and the History of Science, State University of Campinas, São Paulo) in Salvador, Bahia, Brazil. The conference and the volume are dedicated to the memory of Professor Mário Tourasse Teixeira, an educator and researcher who contributed to the formation of several generations of Brazilian logicians.

Contributions were made from leading Brazilian logicians and their Latin-American and European colleagues. All papers were selected by a careful refereeing process and were revised and updated by their authors for publication in this volume.

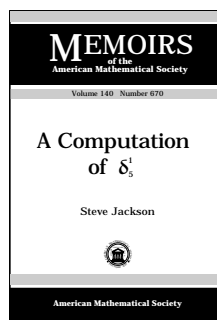
There are three sections: Advances in Logic, Advances in Theoretical Computer Science, and Advances in Philosophical Logic.

Well-known specialists present original research on several aspects of model theory, proof theory, algebraic logic, category theory, connections between logic and computer science, and topics of philosophical logic of current interest. Topics interweave proof-theoretical, semantical, foundational, and philosophical aspects with algorithmic and algebraic views, offering lively high-level research results.

Contents: *Part I. Advances in Logic:* J.-Y. Béziau, The mathematical structure of logical syntax; X. Caicedo and M. Krynicky, Quantifiers for reasoning with imperfect information and Σ_1^1 -logic; W. A. Carnielli and M. Lima-Marques, Society semantics and multiple-valued logics; J. C. Cifuentes, A topological approach to the logic underlying fuzzy subset theory; M. E. Coniglio, Categorical logic with partial elements; M. Dickmann and F. Miraglia, Algebraic K-theory of fields and special groups; A. Di Nola, G. Georgescu, and S. Sessa, Closed ideals of MV-algebras; K. Došen, Definitions of adjunction; N. G. Martínez, A reduced spectrum for MV-algebras; *Part II. Advances in Theoretical Computer Science:* A. Avellone, M. Ferrari, P. Miglioli, and U. Moscato, A tableau calculus for Dummett predicate logic; J. M. Turull Torres, A hierarchy of unbounded almost rigid classes of finite structures; P. A. S. Veloso, Some connections between logic and computer science; *Part III. Advances in Philosophical Logic:* D. Krause and S. French, Opaque predicates, veiled sets and their logic; O. Bueno, Truth, quasi-truth and paraconsistency; G. E. Rosado Haddock, To be a Fregean or to be a Husserlian: That is the question for Platonists; C. Pizzi, A modal framework for consequential implication and the factor law.

Contemporary Mathematics, Volume 235

August 1999, 326 pages, Softcover, ISBN 0-8218-1364-1, LC 99-23309, 1991 *Mathematics Subject Classification*: 03-XX, 03-06; 00B25, 03A05, **Individual member \$36**, List \$60, Institutional member \$48, Order code CONM/235N



A Computation of δ_5^1

Steve Jackson, *University of North Texas, Denton*

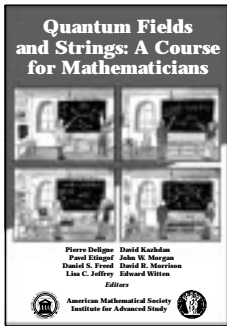
Contents: Introduction; Embedding theorems; Martin's Theorem; The upper bound for δ_5^1 ; Results on uniform cofinalities; Analysis of measures on δ_3^1 ; The strong partition relation on δ_3^1 ; The lower bound for δ_5^1 ; Analysis of measures on $(\delta_5^1)^-$; The weak partition relation on δ_5^1 ; Bibliography.

Memoirs of the American Mathematical Society, Volume 140, Number 670

May 1999, 94 pages, Softcover, ISBN 0-8218-1091-X, LC 99-26354, 1991 *Mathematics Subject Classification*: 03E15, **Individual member \$24**, List \$40, Institutional member \$32, Order code MEMO/140/670N

Mathematical Physics

Supplementary Reading



Quantum Fields and Strings: A Course for Mathematicians

Pierre Deligne, *Institute for Advanced Study, Princeton, NJ*,
Pavel Etingof, *Massachusetts Institute of Technology, Cambridge*,
Daniel S. Freed, *University of Texas, Austin*,
Lisa C. Jeffrey, *University of*

Toronto, ON, Canada, **David Kazhdan**, *Harvard University, Cambridge, MA*, **John W. Morgan**, *Columbia University, New York*, **David R. Morrison**, *Duke University, Durham, NC*, and **Edward Witten**, *Institute for Advanced Study, Princeton, NJ*, Editors

Ideas from quantum field theory and string theory have had considerable impact on mathematics over the past 20 years. Advances in many different areas have been inspired by insights from physics.

In 1996–97 the Institute for Advanced Study (Princeton, NJ) organized a special year-long program designed to teach mathematicians the basic physical ideas which underlie the mathematical applications. The purpose is eloquently stated in a letter written by Robert MacPherson: “The goal is to create and convey an understanding, in terms congenial to mathematicians, of some fundamental notions of physics ... [and to] develop the sort of intuition common among physicists for those who are used to thought processes stemming from geometry and algebra.”

These volumes are a written record of the program. They contain notes from several long and many short courses covering various aspects of quantum field theory and perturbative string theory. The courses were given by leading physicists and the notes were written either by the speakers or by mathematicians who participated in the program. The book also includes problems and solutions worked out by the editors and other leading participants. Interspersed are mathematical texts with background material and commentary on some topics covered in the lectures.

These two volumes present the first truly comprehensive introduction to this field aimed at a mathematics audience. They offer a unique opportunity for mathematicians and mathematical physicists to learn about the beautiful and difficult subjects of quantum field theory and string theory.

Cover artwork was created and provided by Robbert Dijkgraaf. The seal for the Institute for Advanced Study is used with the permission of the Institute.

Contents: *Volume 1, Part 1. Classical Fields and Supersymmetry:* **P. Deligne** and **J. W. Morgan**, Notes on supersymmetry (following Joseph Bernstein); **P. Deligne**, Notes on spinors; **P. Deligne** and **D. S. Freed**, Classical field theory; **P. Deligne** and **D. S. Freed**, Supersolutions; **P. Deligne** and **D. S. Freed**, Sign manifesto; *Volume 1, Part 2. Formal Aspects of QFT:* **P. Deligne**, Note on quantization; **D. Kazhdan**, Introduction to QFT; **E. Witten**, Perturbative quantum field theory; **E. Witten**, Index of Dirac operators; **L. Faddeev**, Elementary introduction

to quantum field theory; **D. Gross**, Renormalization groups; **P. Etingof**, Note on dimensional regularization; **E. Witten**, Homework; Index; *Volume 2, Part 3. Conformal Field Theory and Strings:* **K. Gawędzki**, Lectures on conformal field theory; **E. D’Hoker**, Perturbative string theory; **P. Deligne**, Super space descriptions of super gravity; **D. Gaitsgory**, Notes on 2d conformal field theory and string theory; **A. Strominger**, Kaluza-Klein compactifications, supersymmetry, and Calabi-Yau spaces; *Volume 2, Part 4. Dynamical Aspects of QFT:* **E. Witten**, Dynamics of Quantum Field Theory; **N. Sieberg**, $N = 1$ supersymmetric field theories in four dimensions; Index.

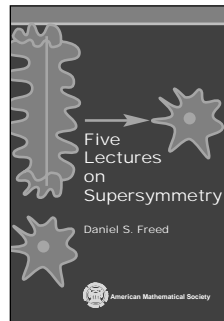
July 1999, 1991 *Mathematics Subject Classification:* 81TXX, LC 99-20755.

Volume 1: 752 pages. *Hardcover:* ISBN 0-8218-1987-9, **All AMS members \$32**, List \$40, Order code QFT/1N; *Softcover:* ISBN 0-8218-2012-5, **All AMS members \$20**, List \$25, Order code QFT/1.SN

Volume 2: 800 pages. *Hardcover:* ISBN 0-8218-1988-7, **All AMS members \$32**, List \$40, Order code QFT/2N; *Softcover:* ISBN 0-8218-2013-3, **All AMS members \$20**, List \$25, Order code QFT/2.SN

Set: 1552 pages. *Hardcover:* ISBN 0-8218-1198-3, **All AMS members \$60**, List \$75, Order code QFT/1/2N; *Softcover:* ISBN 0-8218-2014-1, **All AMS members \$32**, List \$40, Order code QFT/1/2.SN

Supplementary Reading



Five Lectures on Supersymmetry

Daniel S. Freed, *University of Texas, Austin*

Since physicists introduced supersymmetry in the mid 1970s, there have been great advances in the understanding of supersymmetric quantum field theories and string theories. These advances have had important mathematical consequences as well.

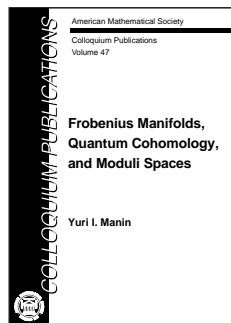
The lectures featured in this book treat fundamental concepts necessary for understanding the physics behind these mathematical applications. Freed approaches the topic with the assumption that the basic notions of supersymmetric field theory are unfamiliar to most mathematicians. He presents the material intending to impart a firm grounding in the elementary ideas.

The first half of the book offers expository introductions to superalgebras, supermanifolds, classical field theory, free quantum theories, and super Poincaré groups. The second half covers specific models and describes some of their geometric features. The overall aim is to explain the classical supersymmetric field theories that are basic for applications in quantum mechanics and quantum field theory, thereby providing readers with sufficient background to explore the quantum ideas.

Contents: What are fermions?; Lagrangians and symmetries; Supersymmetry in various dimensions; Theories with two supersymmetries; Theories with more supersymmetry; References; Index.

May 1999, 119 pages, Softcover, ISBN 0-8218-1953-4, LC 99-14915, 1991 *Mathematics Subject Classification:* 70G50, 81T60, 70H99, 70-02, **All AMS members \$19**, List \$24, Order code FLSN

Recommended Text



Frobenius Manifolds, Quantum Cohomology, and Moduli Spaces

Yuri I. Manin, *Director, Max-Planck-Institut für Mathematik, Bonn, Germany*

This is the first monograph dedicated to the systematic exposition of the whole variety of topics related to

quantum cohomology. The subject first originated in theoretical physics (quantum string theory) and has continued to develop extensively over the last decade.

The author's approach to quantum cohomology is based on the notion of the Frobenius manifold. The first part of the book is devoted to this notion and its extensive interconnections with algebraic formalism of operads, differential equations, perturbations, and geometry. In the second part of the book, the author describes the construction of quantum cohomology and reviews the algebraic geometry mechanisms involved in this construction (intersection and deformation theory of Deligne-Artin and Mumford stacks).

Yuri Manin is currently the director of the Max-Planck-Institut für Mathematik in Bonn, Germany. He has authored and coauthored 10 monographs and almost 200 research articles in algebraic geometry, number theory, mathematical physics, history of culture, and psycholinguistics. Manin's books, such as *Cubic Forms: Algebra, Geometry, and Arithmetic* (1974), *A Course in Mathematical Logic* (1977), *Gauge Field Theory and Complex Geometry* (1988), *Elementary Particles: Mathematics, Physics and Philosophy* (1989, with I. Yu. Kobzarev), *Topics in Non-commutative Geometry* (1991), and *Methods of Homological Algebra* (1996, with S. I. Gelfand), secured for him solid recognition as an excellent expositor. Undoubtedly the present book will serve mathematicians for many years to come.

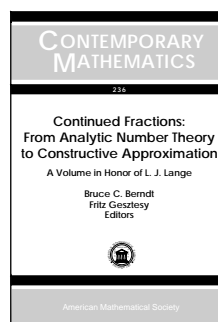
This item will also be of interest to those working in algebra and algebraic geometry.

Contents: Introduction: What is quantum cohomology?; Introduction to Frobenius manifolds; Frobenius manifolds and isomonodromic deformations; Frobenius manifolds and moduli spaces of curves; Operads, graphs, and perturbation series; Stable maps, stacks, and Chow groups; Algebraic geometric introduction to the gravitational quantum cohomology; Bibliography; Subject index.

Colloquium Publications, Volume 47

July 1999, 297 pages, Hardcover, ISBN 0-8218-1917-8, LC 99-18035, 1991 *Mathematics Subject Classification*: 14H10, 14N10, 58D29; 58D10, **All AMS members \$44**, List \$55, Order code COLL/47N

Number Theory



Continued Fractions: From Analytic Number Theory to Constructive Approximation

A Volume in Honor of L. J. Lange

Bruce C. Berndt, *University of Illinois, Urbana*, and Fritz Gesztesy, *University of Missouri, Columbia*, Editors

This volume presents the contributions from the international conference held at the University of Missouri at Columbia, marking Professor Lange's 70th birthday and his retirement from the university. The principal purpose of the conference was to focus on continued fractions as a common interdisciplinary theme bridging gaps between a large number of fields—from pure mathematics to mathematical physics and approximation theory.

Evident in this work is the widespread influence of continued fractions in a broad range of areas of mathematics and physics, including number theory, elliptic functions, Padé approximations, orthogonal polynomials, moment problems, frequency analysis, and regularity properties of evolution equations. Different areas of current research are represented. The lectures at the conference and the contributions to this volume reflect the wide range of applicability of continued fractions in mathematics and the applied sciences.

Contents: R. Askey, Continued fractions and orthogonal polynomials; B. C. Berndt, Y.-S. Choi, and S.-Y. Kang, The problems submitted by Ramanujan to the Journal of the Indian Mathematical Society; B. Bojanov and A. S. Ranga, Some examples of moment preserving approximation; C. F. Bracciali, Relations between certain symmetric strong Stieltjes distributions; A. Bultheel, C. Díaz-Mendoza, P. González-Vera, and R. Orive, Estimates of the rate of convergence for certain quadrature formulas on the half-line; A. Bultheel and P. González-Vera, Wavelets by orthogonal rational kernels; H. H. Chan and V. Tan, On the explicit evaluations of the Rogers-Ramanujan continued fraction; D. Chelst, Absence of phase transitions in modified two-component plasmas: The analytic theory of continued fractions in statistical mechanics; M. E. H. Ismail and D. R. Masson, Some continued fractions related to elliptic functions; W. B. Jones and G. Shen, Asymptotics of Stieltjes continued fraction coefficients and applications to Whittaker functions; L. J. Lange, A generalization of Van Vleck's theorem and more on complex continued fractions; X. Li, Convergence of interpolating Laurent polynomials on an annulus; L. Lorentzen, Convergence criteria for continued fractions $K(a_n/1)$ based on value sets; O. Njåstad, Strong Stieltjes moment problems; F. Peherstorfer and R. Steinbauer, Weak asymptotics of orthogonal polynomials on the support of the measure of orthogonality and considerations on functions of the second kind; S. Perrine, Trees of approximation constants; I. Rodnianski, Continued fractions and Schrödinger evolution; W. Van Assche, Multiple orthogonal polynomials, irrationality and transcendence; A. J. van der Poorten, Reduction of continued fractions of formal power series; H. Waadeland,

Some observations in frequency analysis; **F. Wielonsky**, Some properties of Hermite-Padé approximants to e^z .

Contemporary Mathematics, Volume 236

August 1999, 379 pages, Softcover, ISBN 0-8218-1200-9, LC 99-30750, 1991 *Mathematics Subject Classification*: 42C05, 30B70, 30E05, 40A15; 11-XX, 33-XX, 41-XX, **Individual member \$47**, List \$78, Institutional member \$62, Order code CONM/236N

Back in print from the AMS

History of the Theory of Numbers

Leonard Eugene Dickson

Dickson's *History* is truly a monumental account of the development of one of the oldest and most important areas of mathematics. It is remarkable today to think that such a complete history could even be conceived. That Dickson was able to accomplish such a feat is attested to by the fact that his *History* has become the standard reference for number theory up to that time. One need only look at later classics, such as Hardy and Wright, where Dickson's *History* is frequently cited, to see its importance.

The book is divided into three volumes by topic. In scope, the coverage is encyclopedic, leaving very little out. It is interesting to see the topics being resuscitated today that are treated in detail in Dickson.

The first volume of Dickson's *History* covers the related topics of divisibility and primality. It begins with a description of the development of our understanding of perfect numbers. Other standard topics, such as Fermat's theorem, primitive roots, counting divisors, the Möbius function, and prime numbers themselves are treated. Dickson, in this thoroughness, also includes less workhorse subjects, such as methods of factoring, divisibility of factorials and properties of the digits of numbers. Concepts, results and citations are numerous.

The second volume is a comprehensive treatment of Diophantine analysis. Besides the familiar cases of Diophantine equations, this rubric also covers partitions, representations as a sum of two, three, four or n squares, Waring's problem in general and Hilbert's solution of it, and perfect squares in arithmetical and geometrical progressions. Of course, many important Diophantine equations, such as Pell's equation, and classes of equations, such as quadratic, cubic and quartic equations, are treated in detail. As usual with Dickson, the account is encyclopedic and the references are numerous.

The last volume of Dickson's *History* is the most modern, covering quadratic and higher forms. The treatment here is more general than in Volume II, which, in a sense, is more concerned with special cases. Indeed, this volume chiefly presents methods of attacking whole classes of problems. Again, Dickson is exhaustive with references and citations.

This item will also be of interest to those working in general and interdisciplinary areas.

Contents: *Part 1:* Perfect, multiply perfect, and amicable numbers; Formulas for the number and sum of divisors, problems of Fermat and Wallis; Fermat's and Wilson's theorems, generalizations and converses; symmetric functions of $1, 2, \dots, p-1$, modulo p ; Residue of $(u^{p-1} - 1)/p$ modulo p ; Euler's ϕ -function, generalizations; Farey series; Periodic decimal fractions; periodic fractions; factors of $10^n \pm 1$; Primitive roots, exponents, indices, binomial congruences; Higher congruences; Divisibility of factorials and multinomial coefficients; Sum and number of divisors; Miscellaneous theorems on divisibility, greatest common divisor, least common multiple; Criteria for divisibility by a given number; Factor tables, lists of

primes; Methods of factoring; Fermat numbers $F_n = 2^{2^n} + 1$; Factors of $a^n \pm b^n$; Recurring series; Lucas' u_n, v_n ; Theory of prime numbers; Inversion of functions; Möbius' function $\mu(n)$; numerical integrals and derivatives; Properties of the digits of numbers; Author index; Subject index; *Part 2:* Polygonal, pyramidal and figurate numbers; Linear diophantine equations and congruences; Partitions; Rational right triangles; Triangles, quadrilaterals, and tetrahedra; Sum of two squares; Sum of three squares; Sum of four squares; Sum of n squares; Number of solutions of quadratic congruences in n unknowns; Liouville's series of eighteen articles; Pell equation; $ax^2 + bx + c$ made a square; Further single equations of the second degree; Squares in arithmetical or geometrical progression; Two or more linear functions made squares; Two quadratic functions of one or two unknowns made squares; Systems of two equations of degree two; Three or more quadratic functions of one or two unknowns made squares; Systems of three or more equations of degree two in three or more unknowns; Quadratic form made an n th power; Equations of degree three; Equations of degree four; Equations of degree n ; Sets of integers with equal sums of like powers; Waring's problem and related results; Fermat's last theorem, $ax^r + by^s = cz^t$, and the congruence $x^n + y^n \equiv z^n \pmod{p}$; Author index; Subject index; *Part 3:* Reduction and equivalence of binary quadratic forms, representation of integers; Explicit values of x, y in $x^2 + \Delta y^2 = g$; Composition of binary quadratic forms; Orders and genera; their composition; Irregular determinants; Number of classes of binary quadratic forms with integral coefficients; Binary quadratic forms whose coefficients are complex integers or integers of a field; Number of classes of binary quadratic forms with complex integral coefficients; Ternary quadratic forms; Quaternary quadratic forms; Quadratic forms in n variables; Binary cubic forms; Cubic forms in three or more variables; Forms of degree $n \geq 4$; Binary Hermitian forms; Hermitian forms in n variables and their conjugates; Bilinear forms, matrices, linear substitutions; Representation by polynomials modulo p ; Congruential theory of forms; Author index; Subject index.

AMS Chelsea Publishing

Part 1: May 1999, 486 pages, Hardcover, ISBN 0-8218-1934-8, LC 66-26932, 1991 *Mathematics Subject Classification*: 11-03, 01A05, **All AMS members \$41**, List \$45, Order code CHEL/86.1.HN;
Part 2: May 1999, 803 pages, Hardcover, ISBN 0-8218-1935-6, LC 66-26932, 1991 *Mathematics Subject Classification*: 11-03, 01A05, **All AMS members \$53**, List \$59, Order code CHEL/86.2.HN;
Part 3: May 1999, 313 pages, Hardcover, ISBN 0-8218-1936-4, LC 66-26932, 1991 *Mathematics Subject Classification*: 11-03, 01A05, **All AMS members \$32**, List \$35, Order code CHEL/86.3.HN
Set: May 1999, 1602 pages, Hardcover, ISBN 0-8218-1938-0, LC 66-26932, 1991 *Mathematics Subject Classification*: 11-03, 01A05, **All AMS members \$119**, List \$132, Order code CHEL/86.HN

Prime Numbers and Their Distribution

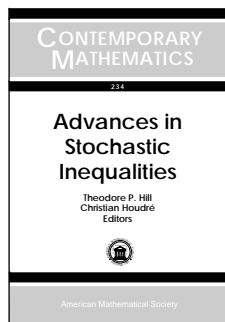
Gérald Tenenbaum, *Université Henri Poincaré, Nancy I, France*, and Michel Mendès France, *Université Bordeaux I, France*

See page 717 for a full description of this volume.

Student Mathematical Library

December 1999 (estimated), approximately 120 pages, Softcover, ISBN 0-8218-1647-0, **All AMS members \$14**, List \$17, Order code STML-TENENBAUN

Probability



Advances in Stochastic Inequalities

Theodore P. Hill and Christian Houdré, *Georgia Institute of Technology, Atlanta*, Editors

This volume contains 15 articles based on invited talks given at an AMS Special Session on "Stochastic Inequalities and Their Applications" held at Georgia Institute of Technology (Atlanta). The session drew international experts who exchanged ideas and presented state-of-the-art results and techniques in the field. Together, the articles in the book give a comprehensive picture of this area of mathematical probability and statistics.

The book includes new results on the following: convexity inequalities for ranges of vector measures; inequalities for tails of Gaussian chaos and for independent symmetric random variables; Bonferroni-type inequalities for sums of stationary sequences; Rosenthal-type second moment inequalities; variance inequalities for functions of multivariate random variables; correlation inequalities for stable random vectors; maximal inequalities for VC classes; deviation inequalities for martingale polynomials; and expectation equalities for bounded mean-zero Gaussian processes. Various articles in the book emphasize applications of stochastic inequalities to hypothesis testing, mathematical finance, statistics, and mathematical physics.

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Contents: P. C. Allaart, Bounds on the non-convexity of ranges of vector measures with atoms; M. A. Arcones, The class of Gaussian chaos of order two is closed by taking limits in distribution; R. C. Bradley, Two inequalities and some applications in connection with ρ^* -mixing, a survey; W.-Y. Chang and D. St. P. Richards, Variance inequalities for functions of multivariate random variables; P. Hitczenko and S. Montgomery-Smith, A note on sums of independent random variables; Y. Hu, Exponential integrability of diffusion processes; A. Jakubowski and J. Rosiński, Local dependencies in random fields via a Bonferroni-type inequality; R. P. Kertz, Pricing-differentials and bounds for lookback options, and prophet problems in probability; A. Koldobsky, A correlation inequality for stable random vectors; R. Latała, A note on the maximal inequalities for VC classes; K. Oleszkiewicz, Comparison of moments via Poincaré-type inequality; I. Pinelis, Fractional sums and integrals of r -concave tails and applications to comparison probability inequalities; J. Rosiński and G. Samorodnitsky, Product formula, tails and independence of multiple stable integrals; J. Szulga, A domination inequality for martingale polynomials; R. A. Vitale, A log-concavity proof for a Gaussian exponential bound.

Contemporary Mathematics, Volume 234

June 1999, 212 pages, Softcover, ISBN 0-8218-1086-3, LC 99-22875, 1991 *Mathematics Subject Classification*: 60E15; 62F15, **Individual member \$27**, List \$45, Institutional member \$36, Order code CONM/234N

Lectures on Contemporary Probability

Gregory F. Lawler, *Duke University, Durham, NC*, and Lester N. Coyle, *Loyola College, Baltimore, MD*

See page 716 for a full description of this volume.

Student Mathematical Library

August 1999, approximately 120 pages, Softcover, ISBN 0-8218-2029-X, 1991 *Mathematics Subject Classification*: 60-02; 60J10, 60J15, 65C05, **All AMS members \$14**, List \$17, Order code STML-LAWLERN

Previously Announced Publications

The following selection of titles were previously announced in "New Publications Offered by the AMS". They are listed alphabetically by author. For information on additional recent publications, visit the AMS Bookstore at www.ams.org/bookstore/.

Supplementary Reading

Nonlinear Functional Analysis

Rajendra Akerkar, *Chh. Shahu Central Institute of Business Education and Research, Kolhapur, India*

A publication of Narosa Publishing House.

This book presents background for the solution of nonlinear equations in Banach spaces. It contains basic techniques in nonlinear analysis and also touches upon today's research. The book deals with recent topics, such as measures on non-compactness, topological degree, and bifurcation theory. It can be used as a text and as a reference source for students and researchers.

Distributed by the AMS exclusively in North America and Europe and non-exclusively elsewhere.

Narosa Publishing House

January 1999, 157 pages, Softcover, ISBN 81-7319-230-8, 1991 *Mathematics Subject Classification*: 46-01, **All AMS members \$22**, List \$27, Order code NAR/4RT96

Supplementary Reading

Symplectic Geometry and Topology

Yakov Eliashberg, *Stanford University, CA*, and Lisa Traynor, *Bryn Mawr College, PA*, Editors

Symplectic geometry has its origins as a geometric language for classical mechanics. But it has recently exploded into an independent field interconnected with many other areas of mathematics and physics. The goal of the IAS/Park City Mathematics Institute Graduate Summer School on Symplectic Geometry and Topology was to give an intensive introduction to these exciting areas of current research. Included in this proceedings are lecture notes from the following courses: *Introduction to Symplectic Topology* by D. McDuff; *Holomorphic Curves and Dynamics in Dimension Three* by H. Hofer; *An Introduction to the Seiberg-Witten Equations on Symplectic Manifolds* by C. Taubes; *Lectures on Floer Homology* by D. Salamon; *A Tutorial on Quantum Cohomology* by A. Givental; *Euler*

Characteristics and Lagrangian Intersections by R. MacPherson; *Hamiltonian Group Actions and Symplectic Reduction* by L. Jeffrey; and *Mechanics: Symmetry and Dynamics* by J. Marsden.

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

IAS/Park City Mathematics Series, Volume 7

May 1999, 431 pages, Hardcover, ISBN 0-8218-0838-9, LC 99-17909, 1991 *Mathematics Subject Classification*: 14-XX, 22-XX, 34-XX, 49-XX, 53-XX, 57-XX, 58-XX, 70-XX, **All AMS members \$55**, List \$69, Order code PCMS/7RT96

Algebra and Geometry

Ming-chang Kang, *National Taiwan University, Taipei, Taiwan*, Editor

A publication of International Press.

This volume presents the proceedings from a conference held at the National Taiwan University. The conference brought together specialists in mathematical physics, algebraic geometry, differential geometry, algebra and number theory from five Pacific Rim countries. Included are articles by S.-T. Yau, V. Kac, M. P. Murthy, Shing-Tung Yau, and other leading specialists.

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

Distributed worldwide, except in Japan, by the American Mathematical Society.

Contributors include: C.-L. Chai, J.-M. Hwang, N. Mok, T. Jiang, S. S.-T. Yau, V. Kac, W.-C. W. Li, T. T. Moh, M. P. Murthy, R. G. Swan, I.-H. Tsai, B. H. Lian, and S.-T. Yau.

International Press

August 1998, 227 pages, Hardcover, ISBN 1-57146-058-6, 1991 *Mathematics Subject Classification*: 00B25, **All AMS members \$34**, List \$42, Order code INPR/32RT96

Understanding the Genome: Technological and Mathematical Challenges, May 21–23, 1998

A publication of MSRI.

This CD-ROM presents video selections from the workshop held at MSRI (Berkeley, CA) for mathematical scientists and scientists in the biotech/pharmaceutical industry.

Featured speakers include D. Botstein, E. Branscomb, G. Churchill, P. Green, D. Haussler, L. Hood, R. Lipshutz, P. Pevzner, D. Siegmund, D. Slonim, G. Stormo, and E. Wijsman.

The purpose of the workshop was to acquaint the audience with the contributions made by mathematics, statistics, and computation to the acquisition and interpretation of genomic data and related areas of functional genomics. Invited speakers gave surveys of the challenges ahead, descriptions of key new technological developments, applications of mathematics and computation to specific related problems in genomics, and analysis of biological systems at the cellular level.

The CD requires Real®Video Player, which can be downloaded for free from the RealNetworks Internet home page. RealVideo Player is available for Windows95/Windows NT, Windows 3.1, MacOS, IRIX 6.2/6.3, Solaris 2.5 and Linux 2.0.

Distributed worldwide by the American Mathematical Society.

®RealVideo is a registered trademark and RealNetworks is a trademark of RealNetworks, Inc.

Contributors include: D. Botstein, E. Branscomb, P. Green, D. Haussler, L. Hood, P. Pevzner, D. Siegmund, D. Slonim, G. Stormo, and E. Wijsman.

Selections From MSRI's Video Archive

December 1998, CD-ROM, 1991 *Mathematics Subject Classification*: 92Dxx, List \$15, Order code MSRICD/3RT96

A Classic

Surgery on Compact Manifolds Second Edition

C. T. C. Wall, *University of Liverpool, England*, and **A. A. Ranicki (Editor)**, *University of Edinburgh, Scotland*

The publication of this book in 1970 marked the culmination of a particularly exciting period in the history of the topology of manifolds. The world of high-dimensional manifolds had been opened up to the classification methods of algebraic topology by Thom's work in 1952 on transversality and cobordism, the signature theorem of Hirzebruch in 1954, and by the discovery of exotic spheres by Milnor in 1956.

In the 1960s, there had been an explosive growth of interest in the surgery method of understanding the homotopy types of manifolds (initially in the differentiable category), including results such as the \mathbb{h} -cobordism theory of Smale (1960), the classification of exotic spheres by Kervaire and Milnor (1962), Browder's converse to the Hirzebruch signature theorem for the existence of a manifold in a simply connected homotopy type (1962), the \mathbb{s} -cobordism theorem of Barden, Mazur, and Stallings (1964), Novikov's proof of the topological invariance of the rational Pontrjagin classes of differentiable manifolds (1965), the fibering theorems of Browder and Levine (1966) and Farrell (1967), Sullivan's exact sequence for the set of manifold structures within a simply connected homotopy type (1966), Casson and Sullivan's disproof of the Hauptvermutung for piecewise linear manifolds (1967), Wall's classification of homotopy tori (1969), and Kirby and Siebenmann's classification theory of topological manifolds (1970).

The original edition of the book fulfilled five purposes by providing:

- a coherent framework for relating the homotopy theory of manifolds to the algebraic theory of quadratic forms, unifying many of the previous results;
- a surgery obstruction theory for manifolds with arbitrary fundamental group, including the exact sequence for the set of manifold structures within a homotopy type, and many computations;
- the extension of surgery theory from the differentiable and piecewise linear categories to the topological category;
- a survey of most of the activity in surgery up to 1970;
- a setting for the subsequent development and applications of the surgery classification of manifolds.

This new edition of this classic book is supplemented by notes on subsequent developments. References have been updated and numerous commentaries have been added. The volume remains the single most important book on surgery theory.

Mathematical Surveys and Monographs, Volume 69

April 1999, 302 pages, Hardcover, ISBN 0-8218-0942-3, LC 99-12274, 1991 *Mathematics Subject Classification*: 57-02, 57R57; 18F25, 19J25, 11E39, **All AMS members \$47**, List \$59, Order code SURV/69RT96