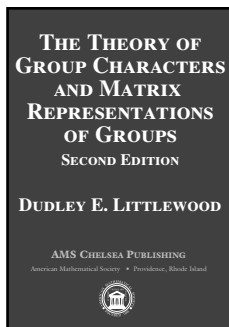


# New Publications Offered by the AMS

## Algebra and Algebraic Geometry



### The Theory of Group Characters and Matrix Representations of Groups Second Edition

Dudley E. Littlewood

Originally written in 1940, this book remains a classical source on

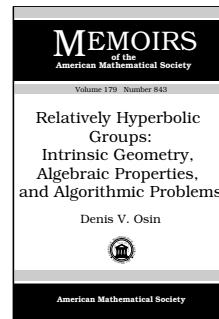
representations and characters of finite and compact groups. The book starts with necessary information about matrices, algebras, and groups. Then the author proceeds to representations of finite groups. Of particular interest in this part of the book are several chapters devoted to representations and characters of symmetric groups and the closely related theory of symmetric polynomials. The concluding chapters present the representation theory of classical compact Lie groups, including a detailed description of representations of the unitary and orthogonal groups. The book, which can be read with minimal prerequisites (an undergraduate algebra course), allows the reader to get a good understanding of beautiful classical results about group representations.

*This item will also be of interest to those working in discrete mathematics and combinatorics.*

**Contents:** Matrices; Algebras; Groups; The Frobenius algebra; The symmetric group; Immanants and  $S$ -functions;  $S$ -functions of special series; The calculation of the characters of the symmetric group; Group characters and the structure of groups; Continuous matrix groups and invariant matrices; Groups of unitary matrices; Appendix; Bibliography; Supplementary bibliography; Index.

AMS Chelsea Publishing

March 2006, 310 pages, Hardcover, ISBN 0-8218-4067-3, 2000 *Mathematics Subject Classification*: 20Cxx, **Individual member US\$41**, List US\$45, Order code CHEL/357.H



### Relatively Hyperbolic Groups: Intrinsic Geometry, Algebraic Properties, and Algorithmic Problems

Denis V. Osin

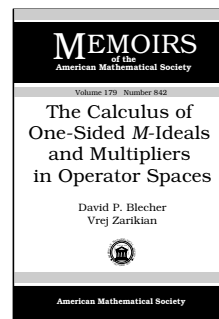
**Contents:** Introduction; Relative isoperimetric inequalities; Geometry of finitely generated relatively

hyperbolic groups; Algebraic properties; Algorithmic problems; Open questions; Appendix. Equivalent definitions of relative hyperbolicity; Bibliography.

**Memoirs of the American Mathematical Society**, Volume 179, Number 843

December 2005, 100 pages, Softcover, ISBN 0-8218-3821-0, LC 2005053663, 2000 *Mathematics Subject Classification*: 20F65; 20F05, 20F06, 20F10, 20F67, 20F69, **Individual member US\$35**, List US\$58, Institutional member US\$46, Order code MEMO/179/843

## Analysis



### The Calculus of One-Sided $M$ -Ideals and Multipliers in Operator Spaces

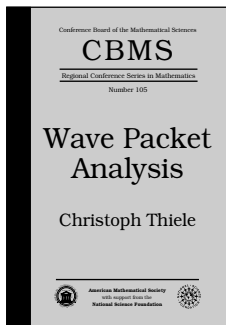
David P. Blecher and Vrej Zarikian

**Contents:** Introduction; Preliminaries; Spatial action; Examples; Constructions; One-sided type decompositions and Morita equivalence; Central  $M$ -structure

for operator spaces; Future directions; Appendix A. Some results from Banach space theory; Appendix B. Infinite matrices over an operator space; Appendix. Bibliography.

**Memoirs of the American Mathematical Society**, Volume 179, Number 842

December 2005, 85 pages, Softcover, ISBN 0-8218-3823-7, LC 2005053579, 2000 *Mathematics Subject Classification*: 46L07, 46L89; 46B20, 46B04, **Individual member US\$35**, List US\$58, Institutional member US\$46, Order code MEMO/179/842



## Wave Packet Analysis

Christoph Thiele

The concept of “wave packet analysis” originates in Carleson’s famous proof of almost everywhere convergence of Fourier series of  $L^2$  functions. It was later used by Lacey and Thiele to prove bounds on the bilinear Hilbert transform. For quite some time, Carleson’s wave packet analysis was thought to be an important idea, but

that it had limited applications. But in recent years, it has become clear that this is an important tool for a number of other applications. This book is an introduction to these tools. It emphasizes the classical successes (Carleson’s theorem and the Hilbert transform) in the main development. However, the book closes with a dedicated chapter on more recent results.

Carleson’s original theorem is sometimes cited as one of the most important developments of 20th century harmonic analysis. The set of ideas stemming from his proof is now seen as an essential element in modern harmonic analysis. Indeed, Thiele won the Salem prize jointly with Michael Lacey for work in this area.

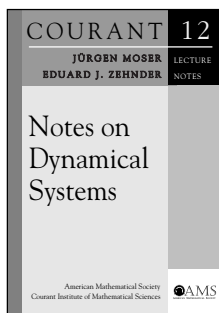
The book gives a nice survey of important material, such as an overview of the theory of singular integrals and wave packet analysis itself. There is a separate chapter on “further developments”, which gives a broader view on the subject, though it does not exhaust all ongoing developments.

**Contents:** Introduction; Wavelets and square functions; Interpolation of multilinear operators; Paraproducts; Wave packets; Multilinear forms with modulation symmetries; Carleson’s theorem; The Walsh model; Further applications of wave packet analysis; Bibliography.

CBMS Regional Conference Series in Mathematics, Number 105

February 2006, 86 pages, Softcover, ISBN 0-8218-3661-7, 2000 *Mathematics Subject Classification:* 42-02; 42A99, 47H60, 42A20, **All Individuals US\$23**, List US\$29, Order code CBMS/105

## Differential Equations



COURSE ADOPTION

## Notes on Dynamical Systems

Jürgen Moser and  
Eduard J. Zehnder

This book is an introduction to the field of dynamical systems, in particular, to the special class of Hamiltonian systems. The authors

aimed at keeping the requirements of mathematical

techniques minimal but giving detailed proofs and many examples and illustrations from physics and celestial mechanics. After all, the celestial  $N$ -body problem is the origin of dynamical systems and gave rise in the past to many mathematical developments.

Jürgen Moser (1928–1999) was a professor at the Courant Institute, New York, and then at ETH Zurich. He served as president of the International Mathematical Union and received many honors and prizes, among them the Wolf Prize in mathematics. Jürgen Moser is the author of several books, among them *Stable and Random Motions in Dynamical Systems*. Eduard Zehnder is a professor at ETH Zurich. He is coauthor with Helmut Hofer of the book *Symplectic Invariants and Hamiltonian Dynamics*.

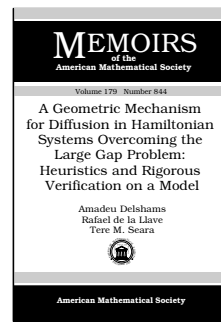
*This item will also be of interest to those working in analysis.*

Titles in this series are copublished with the Courant Institute of Mathematical Sciences at New York University.

**Contents:** Transformation theory; Periodic orbits; Integrable Hamiltonian systems; Bibliography.

**Courant Lecture Notes**, Volume 12

January 2006, 256 pages, Softcover, ISBN 0-8218-3577-7, LC 2005055871, 2000 *Mathematics Subject Classification:* 37-01, 37Kxx, 53Dxx, 58Exx, 70Fxx, 70H05, **All AMS members US\$27**, List US\$34, Order code CLN/12



## A Geometric Mechanism for Diffusion in Hamiltonian Systems Overcoming the Large Gap Problem: Heuristics and Rigorous Verification on a Model

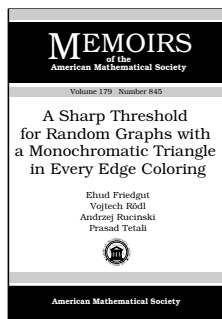
Amadeu Delshams, Rafael de la Llave, and  
Tere M. Seara

**Contents:** Introduction; Heuristic discussion of the mechanism; A simple model; Statement of rigorous results; Notation and definitions, resonances; Geometric features of the unperturbed problem; Persistence of the normally hyperbolic invariant manifold and its stable and unstable manifolds; The dynamics in  $\tilde{\Lambda}_\varepsilon$ ; The scattering map; Existence of transition chains; Orbits shadowing the transition chains and proof of Theorem 4.1; Conclusions and remarks; An example; Acknowledgments; Bibliography.

**Memoirs of the American Mathematical Society**, Volume 179, Number 844

December 2005, 141 pages, Softcover, ISBN 0-8218-3824-5, LC 2005053662, 2000 *Mathematics Subject Classification:* 37J40, 37C29, 34C37; 70H08, 37C50, 34C29, **Individual member US\$37**, List US\$62, Institutional member US\$50, Order code MEMO/179/844

## Discrete Mathematics and Combinatorics



### A Sharp Threshold for Random Graphs with a Monochromatic Triangle in Every Edge Coloring

Ehud Friedgut, Vojtech Rödl, Andrzej Ruciński, and Prasad Tetali

**Contents:** Introduction; Outline of the proof; Tepees and constellations; Regularity; The core section (Proof of Lemma 2.4); Random graphs; Summary, further remarks, glossary; Bibliography.

**Memoirs of the American Mathematical Society**, Volume 179, Number 845

December 2005, 66 pages, Softcover, ISBN 0-8218-3825-3, LC 2005053660, 2000 *Mathematics Subject Classification*: 05C15; 05C55, 05C80, **Individual member US\$30**, List US\$50, Institutional member US\$40, Order code MEMO/179/845

and expositors is intended to capture the essence of the Coxeter legacy. It is a mixture of surveys, up-to-date information, history, storytelling, and personal memories; and it includes a rich variety of beautiful illustrations.

*This item will also be of interest to those working in discrete mathematics and combinatorics.*

**Contents:** B. Mühlherr, The isomorphism problem for Coxeter groups; A. V. Borovik, Coxeter theory: The cognitive aspects; M. Ronan, From Galois and Lie to Tits buildings; B. Kostant, The Coxeter element and the branching law for the finite subgroups of  $SU(2)$ ; R. Kellerhals, Hyperbolic Coxeter groups and space forms; P. McMullen and E. Schulte, Regular and chiral polytopes in low dimensions; B. Monson and A. I. Weiss, Polytopes, honeycombs, groups and graphs; J. M. Wills, Equivelar polyhedra; A. Khovanskii, Combinatorics of sections of polytopes and Coxeter groups in Lobachevsky spaces; M. Senechal, Donald and the golden rhombohedra; B. Grünbaum, Configurations of points and lines; J. Richter-Gebert, Meditations on Ceva's theorem; D. Schattschneider, Coxeter and the artists: Two-way inspiration; M. Emmer, The visual mind: Art, mathematics and cinema; Publications of H. S. M. Coxeter; Index.

March 2006, 321 pages, Hardcover, ISBN 0-8218-3722-2, 2000 *Mathematics Subject Classification*: 01A99, 14M25, 20E42, 20F55, 22E46, 51A20, 51M20, 52B15, 52C23, 52B70, **All AMS members US\$55**, List US\$69, Order code COXETER

## General and Interdisciplinary



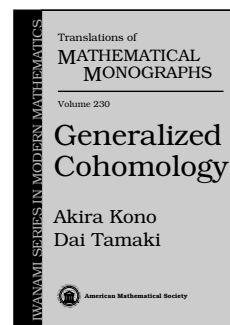
### The Coxeter Legacy Reflections and Projections

Chandler Davis and Erich W. Ellers, Editors

Donald Coxeter infused enthusiasm, even passion, for mathematics in people of any age, any background, any profession, any walk of life.

Enchanted by Euclidean geometry, he was interested in the beauty, the description, and the exploration of the world around us. His involvement in art and with artists earned him admiration and friends in the intellectual community all over the globe. Coxeter's devotion to polytopes and his interest in the theory of configurations live on in his students and followers. Coxeter groups arise in various subjects in applied mathematics, and they have a permanent place in some of the most demanding and fascinating branches of abstract mathematics, such as Lie algebras, algebraic groups, Chevalley groups, and Kac-Moody groups. This collection of articles by outstanding researchers

## Geometry and Topology



### Generalized Cohomology

Akira Kono and Dai Tamaki

In the 1950s, Eilenberg and Steenrod presented their famous characterization of homology theory by seven axioms. Somewhat later, it was found that keeping just the first six of these axioms (all except the condition on the "homology" of the point), one can obtain many other

interesting systems of algebraic invariants of topological manifolds, such as  $K$ -theory, cobordisms, and others. These theories come under the common name of generalized homology (or cohomology) theories.

The purpose of the book is to give an exposition of generalized (co)homology theories that can be read by a wide group of mathematicians who are not experts in algebraic topology. It starts with basic notions of homotopy theory and then introduces the axioms of generalized (co)homology theory. Then the authors discuss various types of generalized cohomology theories, such as complex-oriented cohomology theories and Chern classes,  $K$ -theory, complex cobordisms, and formal group laws. A separate chapter is devoted to spectral sequences and their use in generalized cohomology theories.

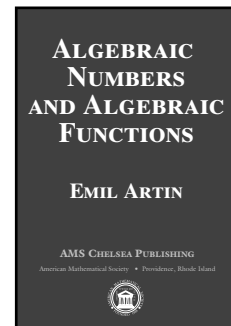
The book is intended to serve as an introduction to the subject for mathematicians who do not have advanced knowledge of algebraic topology. Prerequisites include standard graduate courses in algebra and topology, with some knowledge of ordinary homology theory and homotopy theory.

**Contents:** Preliminaries; Generalized cohomology; Characteristic classes of vector bundles;  $K$ -theory; Spectral sequence; Complex cobordism and its applications; Simplicial techniques; Limits; Spectrum; Bibliography; Index.

**Translations of Mathematical Monographs** (*Iwanami Series in Modern Mathematics*), Volume 230

March 2006, approximately 272 pages, Softcover, ISBN 0-8218-3514-9, 2000 *Mathematics Subject Classification*: 55N20; 55N15, 55N22, 55N40, 55T05, 55-02, **All AMS members US\$39**, List US\$49, Order code MMONO/230

## Number Theory



### Algebraic Numbers and Algebraic Functions

Emil Artin

Famous Norwegian mathematician Niels Henrik Abel advised that one should “learn from the masters, not from the pupils”. When the subject is algebraic numbers and algebraic functions, there is no greater master than Emil Artin. In this classic text,

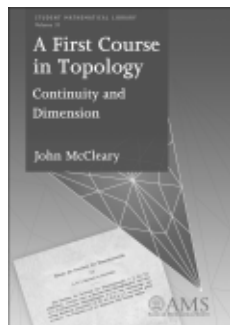
originated from the notes of the course given at Princeton University in 1950–1951 and first published in 1967, one has a beautiful introduction to the subject accompanied by Artin’s unique insights and perspectives. The exposition starts with the general theory of valuation fields in Part I, proceeds to the local class field theory in Part II, and then to the theory of function fields in one variable (including the Riemann-Roch theorem and its applications) in Part III.

Prerequisites for reading the book are a standard first-year graduate course in algebra (including some Galois theory) and elementary notions of point set topology. With many examples, this book can be used by graduate students and all mathematicians learning number theory and related areas of algebraic geometry of curves.

**Contents:** *General valuation theory:* Valuations of a field; Complete fields;  $e$ ,  $f$  and  $n$ ; Ramification theory; The different; *Local class field theory:* Preparations for local class field theory; The first and second inequalities; The norm residue symbol; The existence theorem; Applications and illustrations; *Product formula and function fields in one variable:* Preparations for the global theory; Characterization of fields by the product formula; Differentials in  $PF$ -fields; The Riemann-Roch theorem; Constant field extensions; Applications of the Riemann-Roch theorem; Differentials in function fields; Theorems on  $p$ -groups and Sylow groups; Index of symbols; Subject index.

#### AMS Chelsea Publishing

January 2006, 349 pages, Hardcover, ISBN 0-8218-4075-4, 2000 *Mathematics Subject Classification*: 11-01, 11Rxx, 11Sxx, **Individual member US\$44**, List US\$49, Order code CHEL/358.H



COURSE ADOPTION

### A First Course in Topology Continuity and Dimension

John McCleary

How many dimensions does our universe require for a comprehensive physical description? In 1905, Poincaré

argued philosophically about the necessity of the three familiar dimensions, while recent research is based on 11 dimensions or even 23 dimensions. The notion of dimension itself presented a basic problem to the pioneers of topology. Cantor asked if dimension was a topological feature of Euclidean space. To answer this question, some important topological ideas were introduced by Brouwer, giving shape to a subject whose development dominated the twentieth century.

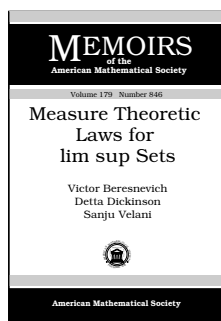
The basic notions in topology are varied and a comprehensive grounding in point-set topology, the definition and use of the fundamental group, and the beginnings of homology theory requires considerable time. The goal of this book is a focused introduction through these classical topics, aiming throughout at the classical result of the Invariance of Dimension.

This text is based on the author’s course given at Vassar College and is intended for advanced undergraduate students. It is suitable for a semester-long course on topology for students who have studied real analysis and linear algebra. It is also a good choice for a capstone course, senior seminar, or independent study.

**Contents:** A little set theory; Metric and topological spaces; Geometric notions; Building new spaces from old; Connectedness; Compactness; Homotopy and the fundamental group; Computations and covering spaces; The Jordan Curve Theorem; Simplicial complexes; Homology; Bibliography.

**Student Mathematical Library**, Volume 31

April 2006, approximately 216 pages, Softcover, ISBN 0-8218-3884-9, 2000 *Mathematics Subject Classification*: 54-01, 55-01, 54F45, **All AMS members US\$28**, List US\$35, Order code STML/31



## Measure Theoretic Laws for lim sup Sets

Victor Beresnevich, Detta Dickinson, and Sanju Velani

**Contents:** Introduction; Ubiquity and conditions on the general setp; The statements of the main theorems; Remarks and corollaries to Theorem 1; Remarks and corollaries to Theorem 2; The classical results; Hausdorff measures and dimension; Positive and full  $m$ -measure sets; Proof of Theorem 1; Proof of Theorem 2:

$0 \leq G < \infty$ ; Proof of Theorem 2:  $G = \infty$ ; Applications; Bibliography.

**Memoirs of the American Mathematical Society**, Volume 179, Number 846

December 2005, 91 pages, Softcover, ISBN 0-8218-3827-X, LC 2005053661, 2000 *Mathematics Subject Classification*: 11J83, 11J13, 11K60, 28A78, 28A80, **Individual member US\$35**, List US\$58, Institutional member US\$46, Order code MEMO/179/846

other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

**Contents:** P. Beelen, A. Garcia, and H. Stichtenoth, On towers of function fields over finite fields; M. Bras-Amorós, Addition behavior of a numerical semigroup; O. Moreno and F. N. Castro, On the calculation and estimation of Waring number for finite fields; G. Frey and T. Lange, Mathematical background of Public Key Cryptography; A. Garcia, On curves over finite fields; F. Hajir, Tame pro- $p$  Galois groups: A survey of recent work; E. W. Howe, K. E. Lauter, and J. Top, Pointless curves of genus three and four; D. Le Brigand, Real quadratic extensions of the rational function field in characteristic two; S. R. Louboutin, Explicit upper bounds for the residues at  $s = 1$  of the Dedekind zeta functions of some totally real number fields; S. Ballet and R. Rolland, On the bilinear complexity of the multiplication in finite fields; Yu. G. Zarhin, Homomorphisms of abelian varieties.

**Séminaires et Congrès**, Number 11

September 2005, 216 pages, Softcover, ISBN 2-85629-175-9, 2000 *Mathematics Subject Classification*: 14H05, 14G05, 11G20, 20M99, 94B27, 11T06, 11T71, 11R37, 14G10, 14G15, 11R58, 11A55, 11R42, 11Yxx, 12E20, 14H40, 14K05, **Individual member US\$53**, List US\$59, Order code SECO/11

## New AMS-Distributed Publications

### Geometry and Topology

#### Arithmetic, Geometry and Coding Theory (AGCT 2003)

Yves Aubry and Gilles Lachaud, *Institut de Mathématiques de Luminy, Marseille, France*, Editors

In May 2003, two events were held in the CIRM (Marseille-Luminy) devoted to arithmetic, geometry and their applications in coding theory and cryptography: a European school "Algebraic Geometry and Information Theory" and the 9th international conference "Arithmetic, Geometry and Coding Theory". Some of the courses of the conferences are published in this volume. Topics covered include: Abelian varieties, function fields and curves over finite fields, Galois group of pro- $p$  extensions, Dedekind zeta functions of number fields, numerical semigroups, Waring numbers, bilinear complexity of the multiplication in finite fields and class number problems.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from

## Logic and Foundations

### The Continuum

#### A Constructive Approach to Basic Concepts of Real Analysis

Rudolf Taschner, *Vienna University of Technology, Austria*, Editor

In this small text the basic theory of the continuum, including the elements of metric space theory and continuity, is developed within the system of intuitionistic mathematics in the sense of L.E.J. Brouwer and H. Weyl. The main features are proofs of the famous theorems of Brouwer concerning the continuity of all functions that are defined on "whole" intervals, the uniform continuity of all functions that are defined on compact intervals and the uniform convergence of all pointwise converging sequences of functions defined on compact intervals. The constructive approach is interesting both in itself and as a contrast to, for example, the formal axiomatic one.

A publication of Vieweg Verlag. The AMS is exclusive distributor in North America. Vieweg Verlag Publications are available worldwide from the AMS outside of Germany, Switzerland, Austria, and Japan.

**Contents:** Introduction and historical remarks; Real numbers; Metric spaces; Continuous functions; Literature; Index.

#### Vieweg Monographs

September 2005, 136 pages, Hardcover, ISBN 3-8348-0040-6, 2000 *Mathematics Subject Classification*: 03F55, 26A03, **All AMS members US\$43**, List US\$48, Order code VW/13