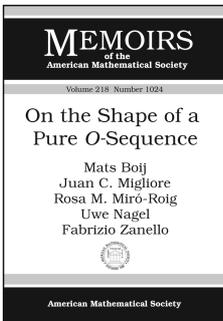


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Algebra and Algebraic Geometry



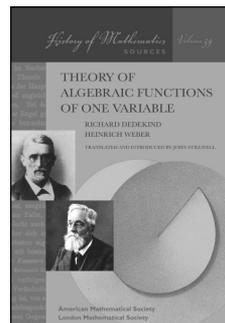
On the Shape of a Pure O -Sequence

Mats Boij, *Royal Institute of Technology, Stockholm, Sweded*,
Juan C. Migliore, *University of Notre Dame, IN*, **Rosa M Miró-Roig**,
University of Barcelona, Spain,
Uwe Nagel, *University of Kentucky, Lexington, KY*, and **Fabrizio Zanello**,
Michigan Technological University, Houghton, MI

Contents: Introduction; Definitions and preliminary results; Differentiability and unimodality; The interval conjecture for pure O -sequences; Enumerating pure O -sequences; Monomial Artinian level algebras of type two in three variables; Failure of the WLP and the SLP; Remarks on pure f -vectors; Some open or open-ended problems; Appendix A. Collection of definitions and notation; Bibliography.

Memoirs of the American Mathematical Society, Volume 218, Number 1024

June 2012, 78 pages, Softcover, ISBN: 978-0-8218-6910-9, LC 2012007082, 2010 *Mathematics Subject Classification*: 13D40, 05E40, 06A07, 13E10, 13H10; 05A16, 05B35, 14M05, 13F20, **Individual member US\$36**, List US\$60, Institutional member US\$48, Order code MEMO/218/1024



Theory of Algebraic Functions of One Variable

Richard Dedekind and Heinrich Weber

Translated and introduced by John Stillwell

This book is the first English translation of the classic long paper *Theorie der algebraischen Functionen einer Veränderlichen* (*Theory of algebraic functions of one variable*), published by Dedekind and Weber in 1882. The translation has been enriched by a Translator's Introduction that includes historical background, and also by extensive commentary embedded in the translation itself.

The translation, introduction, and commentary provide the first easy access to this important paper for a wide mathematical audience: students, historians of mathematics, and professional mathematicians.

Why is the Dedekind-Weber paper important? In the 1850s, Riemann initiated a revolution in algebraic geometry by interpreting algebraic curves as surfaces covering the sphere. He obtained deep and striking results in pure algebra by intuitive arguments about surfaces and their topology. However, Riemann's arguments were not rigorous, and they remained in limbo until 1882, when Dedekind and Weber put them on a sound foundation.

The key to this breakthrough was to develop the theory of algebraic functions in analogy with Dedekind's theory of algebraic numbers, where the concept of ideal plays a central role. By introducing such concepts into the theory of algebraic curves, Dedekind and Weber paved the way for modern algebraic geometry.

This volume is one of an informal sequence of works within the History of Mathematics series. Volumes in this subset, "Sources", are classical mathematical works that served as cornerstones for modern mathematical thought.

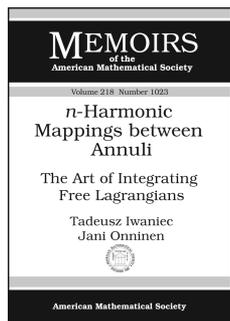
This item will also be of interest to those working in number theory and analysis.

Co-published with the London Mathematical Society beginning with Volume 4. Members of the LMS may order directly from the AMS at the AMS member price. The LMS is registered with the Charity Commissioners.

Contents: Translator's introduction; Theory of algebraic functions of one variable; Introduction; Part I; Part II; Bibliography; Index.

History of Mathematics, Volume 39

October 2012, approximately 157 pages, Softcover, ISBN: 978-0-8218-8330-3, 2010 *Mathematics Subject Classification*: 01-02, 01A55, **AMS members US\$39.20**, List US\$49, Order code HMATH/39



n-Harmonic Mappings between Annuli

The Art of Integrating Free Lagrangians

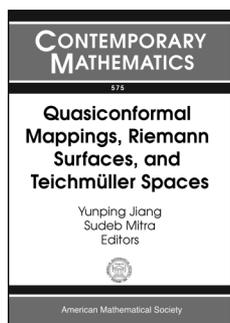
Tadeusz Iwaniec, *Syracuse University, NY, and University of Helsinki, Finland*, and **Jani Onninen**, *Syracuse University, NY*

Contents: Introduction and overview; *Part*

1. *Principal Radial n-Harmonics*: Nonexistence of *n*-Harmonic homeomorphisms; Generalized *n*-Harmonic mappings; Notation; Radial *n*-harmonics; Vector calculus on annuli; Free Lagrangians; Some estimates of free Lagrangians; Proof of Theorem 1.15; *Part* 2. *The n-Harmonic Energy*: Harmonic mappings between planar annuli, Proof of Theorem 1.8; Contracting Pair, $\text{Mod } \mathbb{A}^* \leq \text{Mod } \mathbb{A}$; Expanding Pair, $\text{Mod } \mathbb{A}^* > \text{Mod } \mathbb{A}$; The uniqueness; Above the upper Nitsche bound, $n \geq 4$; Quasiconformal mappings between annuli; Bibliography.

Memoirs of the American Mathematical Society, Volume 218, Number 1023

June 2012, 105 pages, Softcover, ISBN: 978-0-8218-5357-3, LC 2012007086, 2010 *Mathematics Subject Classification*: 30C65, 30C75, 35J20, **Individual member US\$42**, List US\$70, Institutional member US\$56, Order code MEMO/218/1023



Quasiconformal Mappings, Riemann Surfaces, and Teichmüller Spaces

Yunping Jiang and **Sudeb Mitra**, *Queens College, CUNY, Flushing, NY, and Graduate Center of the City University of New York, NY*, Editors

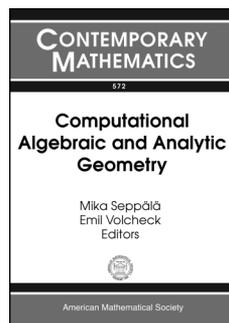
This volume contains the proceedings of the AMS Special Session on Quasiconformal Mappings, Riemann Surfaces, and Teichmüller Spaces, held in honor of Clifford J. Earle, from October 2–3, 2010, in Syracuse, New York.

This volume includes a wide range of papers on Teichmüller theory and related areas. It provides a broad survey of the present state of research and the applications of quasiconformal mappings, Riemann surfaces, complex dynamical systems, Teichmüller theory, and geometric function theory. The papers in this volume reflect the directions of research in different aspects of these fields and also give the reader an idea of how Teichmüller theory intersects with other areas of mathematics.

Contents: **W. Abikoff**, Some remarks on singly degenerate Kleinian groups; **O. Antolin-Camarena** and **S. Koch**, On a theorem of Kas and Schlessinger; **A. Basmajian**, Conformally scattered sets in the unit circle; **J. P. Bowman**, Finiteness conditions on translation surfaces; **C. J. Earle** and **A. Marden**, Holomorphic plumbing coordinates; **A. Fletcher** and **R. Fryer**, On Böttcher coordinates and quasiregular maps; **E. Fujikawa**, Discontinuity of asymptotic Teichmüller modular group; **F. P. Gardiner** and **Z. Wang**, Extremal annuli on the sphere; **J. Gilman** and **L. Keen**, Lifting free subgroups of $PSL(2, \mathbb{R})$ to free groups; **G. González-Diez** and **D. Torres-Teigell**, An introduction to Beauville surfaces via uniformization; **W. J. Harvey** and **A. Lloyd-Phillips**, Symmetry and moduli spaces for Riemann surfaces; **J. Hu** and **O. Muzician**, Conformally natural extensions of continuous circle maps: I. The case when the pushforward measure has no atom; **X. Huang** and **J. Liu**, Normal and quasinormal families of quasiregular mappings; **Y. Jiang**, Symmetric invariant measures; **Y. Jiang** and **S. Mitra**, Douady-Earle section, holomorphic motions, and some applications; **Y. Komori**, Cook-hats and crowns; **I. Kra**, On cohomology of Kleinian groups V : *b*-groups; **Z. Li** and **Y. Qi**, Fundamental inequalities of Reich-Strebel and triangles in a Teichmüller space; **K. Matsuzaki**, The Petersson series vanishes at infinity; **Y. Shen**, On fiber spaces over Teichmüller spaces; **H. Shiga**, On the number of holomorphic families of Riemann surfaces; **Y. Shinomiya**, Veech groups of flat structures on Riemann surfaces; **S. A. Wolpert**, On families of holomorphic differentials on degenerating annuli; **G. Yao**, Transformations of spheres without the injectivity assumption.

Contemporary Mathematics, Volume 575

August 2012, approximately 379 pages, Softcover, ISBN: 978-0-8218-5340-5, 2010 *Mathematics Subject Classification*: 30Fxx, 30C62, 30C65, 30C75, 30F40, 32G15, 32G13, 37F30, 30F10, 30F15, **AMS members US\$95.20**, List US\$119, Order code CONM/575



Computational Algebraic and Analytic Geometry

Mika Seppälä, *Florida State University, Tallahassee, FL, and University of Helsinki, Finland*, and **Emil Volcheck**, Editors

This volume contains the proceedings of three AMS Special Sessions on

Computational Algebraic and Analytic Geometry for Low-Dimensional Varieties held January 8, 2007, in New Orleans, LA; January 6, 2009, in Washington, DC; and January 6, 2011, in New Orleans, LA.

Algebraic, analytic, and geometric methods are used to study algebraic curves and Riemann surfaces from a variety of points of view. The object of the study is the same. The methods are different. The fact that a multitude of methods, stemming from very different mathematical cultures, can be used to study the same objects makes this area both fascinating and challenging.

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

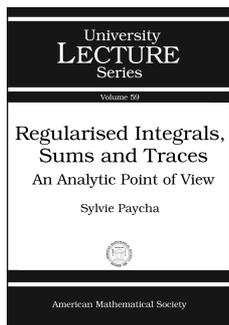
Contents: **A. Arnold** and **K.-D. Semmler**, Large hyperbolic polygons and hyperelliptic Riemann surfaces; **G. Bartolini**, **A. F. Costa**, and **M. Izquierdo**, On isolated strata of pentagonal Riemann surfaces in the branch locus of moduli spaces; **E. Bujalance**, **F. J. Cirre**, and **M. D. E. Conder**, Finite group actions of large order on compact bordered

surfaces; **I. Coskun**, Surfaces of low degree containing a canonical curve; **E. Fortuna, P. Gianni**, and **B. Trager**, Ideals of curves given by points; **D. Glass**, Non-genera of curves with automorphisms in characteristic p ; **R. A. Hidalgo** and **M. Seppälä**, Numerical Schottky uniformizations of certain cyclic L-gonal curves; **E. Hironaka**, Generalized lantern relations and planar line arrangements; **K. S. Kedlaya**, Effective p -adic cohomology for cyclic cubic threefolds; **K. Magaard, S. Shpectorov**, and **G. Wang**, Generating sets of affine groups of low genus; **L. X. C. Ngô, J. R. Sendra**, and **F. Winkler**, Classification of algebraic ODEs with respect to rational solvability; **C. T. Sass, K. Stephenson**, and **G. B. Williams**, Circle packings on conformal and affine tori; **J. Schicho** and **D. Sevilla**, Effective radical parametrization of trigonal curves.

Contemporary Mathematics, Volume 572

July 2012, approximately 235 pages, Softcover, ISBN: 978-0-8218-6869-0, LC 2012009188, 2010 *Mathematics Subject Classification*: 14Hxx, 30Fxx, 68Wxx, **AMS members US\$68.80**, List US\$86, Order code CONM/572

Analysis



Regularised Integrals, Sums and Traces

An Analytic Point of View

Sylvie Paycha, *Universität Potsdam, Germany, and Université Blaise Pascal, Aubière, France*

"Regularization techniques" is the common name for a variety of methods used to make sense of divergent series, divergent

integrals, or traces of linear operators in infinite-dimensional spaces. Such methods are often indispensable in problems of number theory, geometry, quantum field theory, and other areas of mathematics and theoretical physics. However arbitrary and noncanonical they might seem at first glance, regularized sums, integrals, and traces often contain canonical concepts, and the main purpose of this book is to illustrate and explain this.

This book provides a unified and self-contained mathematical treatment of various regularization techniques. The author shows how to derive regularized sums, integrals, and traces from certain canonical building blocks of the original divergent object. In the process of putting together these "building blocks", one encounters many problems and ambiguities caused by various so-called anomalies, which are investigated and explained in detail. Nevertheless, it turns out that the corresponding canonical sums, integrals, sums, and traces are well behaved, thus making the regularization procedure possible and manageable.

This new unified outlook on regularization techniques in various fields of mathematics and in quantum field theory can serve as an introduction for anyone from a beginning mathematician interested in the subject to an experienced physicist who wants to gain a unified outlook on techniques he/she uses on a daily basis.

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

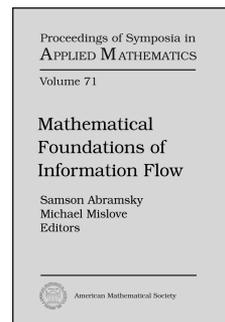
Contents: The Gamma function extended to nonpositive integer points; The canonical integral and noncommutative residue on

symbols; The cut-off regularised integral; The noncommutative residue as a complex residue; The canonical sum on noninteger order classical symbols; Traces on pseudodifferential operators; Weighted traces; Logarithmic residues; Anomalies of regularised determinants; Bibliography; Index.

University Lecture Series, Volume 59

August 2012, approximately 192 pages, Softcover, ISBN: 978-0-8218-5367-2, LC 2012010029, 2010 *Mathematics Subject Classification*: 11M06, 40A10, 47L80, 81T50, 65B15, **AMS members US\$34.40**, List US\$43, Order code ULECT/59

Applications



Mathematical Foundations of Information Flow

Samson Abramsky, *University of Oxford, United Kingdom*, and **Michael Mislove**, *Tulane University, New Orleans, LA*, Editors

This volume is based on the 2008 Clifford Lectures on Information Flow in Physics, Geometry and Logic and Computation, held March 12–15, 2008, at Tulane University in New Orleans, Louisiana.

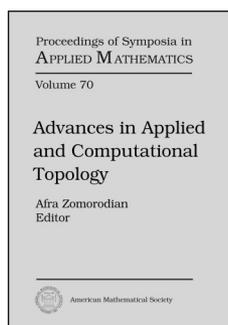
The varying perspectives of the researchers are evident in the topics represented in the volume, including mathematics, computer science, quantum physics and classical and quantum information. A number of the articles address fundamental questions in quantum information and related topics in quantum physics, using abstract categorical and domain-theoretic models for quantum physics to reason about such systems and to model spacetime.

Readers can expect to gain added insight into the notion of information flow and how it can be understood in many settings. They also can learn about new approaches to modeling quantum mechanics that provide simpler and more accessible explanations of quantum phenomena, which don't require the arcane aspects of Hilbert spaces and the cumbersome notation of bras and kets.

Contents: **S. Abramsky** and **C. Heunen**, H^* -algebras and nonunital Frobenius algebras: First steps in infinite-dimensional categorical quantum mechanics; **H. Barnum, J. Barrett, M. Leifer**, and **A. Wilce**, Teleportation in general probabilistic theories; **A. Brandenburger, A. Friedenberg**, and **H. J. Keisler**, Fixed points in epistemic game theory; **B. Coecke** and **B. Edwards**, Spekken's toy theory as a category of processes; **P. Hines** and **P. Scott**, Categorical traces from single-photon linear optics; **K. H. Hofmann** and **M. Mislove**, Compact affine monoids, harmonic analysis and information theory; **K. Martin**, The scope of a quantum channel; **K. Martin** and **P. Panangaden**, Spacetime geometry from causal structure and a measurement; **D. Pavlovic**, Geometry of abstraction in quantum computation.

Proceedings of Symposia in Applied Mathematics, Volume 71

July 2012, approximately 270 pages, Hardcover, ISBN: 978-0-8218-4923-1, 2010 *Mathematics Subject Classification*: 18D35, 22A15, 78A15, 81P10, 81P45, 83C99, 91A10, **AMS members US\$61.60**, List US\$77, Order code PSAPM/71



Advances in Applied and Computational Topology

Afra Zomorodian, *The D. E. Shaw Group, New York, NY*, Editor

What is the shape of data? How do we describe flows? Can we count by integrating? How do we plan with uncertainty? What is the most compact representation? These questions, while

unrelated, become similar when recast into a computational setting. Our input is a set of finite, discrete, noisy samples that describes an abstract space. Our goal is to compute qualitative features of the unknown space. It turns out that topology is sufficiently tolerant to provide us with robust tools.

This volume is based on lectures delivered at the 2011 AMS Short Course on Computational Topology, held January 4-5, 2011 in New Orleans, Louisiana.

The aim of the volume is to provide a broad introduction to recent techniques from applied and computational topology. Afra Zomorodian focuses on topological data analysis via efficient construction of combinatorial structures and recent theories of persistence. Marian Mrozek analyzes asymptotic behavior of dynamical systems via efficient computation of cubical homology. Justin Curry, Robert Ghrist, and Michael Robinson present Euler Calculus, an integral calculus based on the Euler characteristic, and apply it to sensor and network data aggregation. Michael Erdmann explores the relationship of topology, planning, and probability with the strategy complex. Jeff Erickson surveys algorithms and hardness results for topological optimization problems.

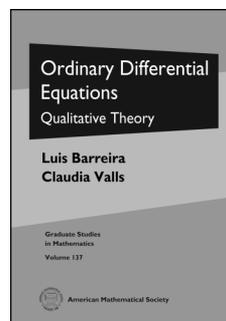
This item will also be of interest to those working in geometry and topology.

Contents: A. Zomorodian, Topological data analysis; M. Mrozek, Topological dynamics: Rigorous numerics via cubical homology; J. Curry, R. Ghrist, and M. Robinson, Euler calculus with applications to signals and sensing; M. Erdmann, On the topology of discrete planning with uncertainty; J. Erickson, Combinatorial optimization of cycles and bases; Index.

Proceedings of Symposia in Applied Mathematics, Volume 70

July 2012, 232 pages, Hardcover, ISBN: 978-0-8218-5327-6, LC 2012008031, 2010 *Mathematics Subject Classification*: 55N35, 55U05, 55-04, 37B30, 37M99, 37D45, 55N30, 53C65, 68T37, 68T40, 68W05, 68Q25, **AMS members US\$48**, List US\$60, Order code PSAPM/70

Differential Equations



Ordinary Differential Equations

Qualitative Theory

Luis Barreira and Claudia Valls, *Instituto Superior Técnico, Lisbon, Portugal*

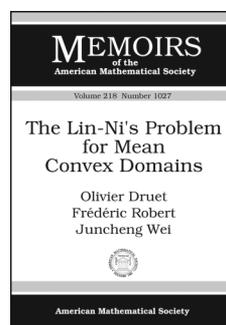
This textbook provides a comprehensive introduction to the qualitative theory of ordinary differential equations. It includes

a discussion of the existence and uniqueness of solutions, phase portraits, linear equations, stability theory, hyperbolicity and equations in the plane. The emphasis is primarily on results and methods that allow one to analyze qualitative properties of the solutions without solving the equations explicitly. The text includes numerous examples that illustrate in detail the new concepts and results as well as exercises at the end of each chapter. The book is also intended to serve as a bridge to important topics that are often left out of a course on ordinary differential equations. In particular, it provides brief introductions to bifurcation theory, center manifolds, normal forms and Hamiltonian systems.

Contents: *Basic concepts and linear equations:* Ordinary differential equations; Linear equations and conjugacies; *Stability of hyperbolicity:* Stability and Lyapunov functions; Hyperbolicity and topological conjugacies; Existence of invariant manifolds; *Equations in the plane:* Index theory; Poincaré-Bendixson theory; *Further topics:* Bifurcations and center manifolds; Hamiltonian systems; Bibliography; Index.

Graduate Studies in Mathematics, Volume 137

July 2012, 248 pages, Hardcover, ISBN: 978-0-8218-8749-3, LC 2012010848, 2010 *Mathematics Subject Classification*: 34-01, 34Cxx, 34Dxx, 37Gxx, 37Jxx, **AMS members US\$51.20**, List US\$64, Order code GSM/137



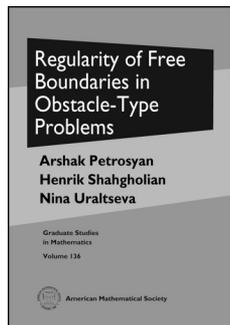
The Lin-Ni's Problem for Mean Convex Domains

Olivier Druet, *École Normale Supérieure de Lyon, France*, Frédéric Robert, *Université Henri Poincaré Nancy, Vandoeuvre-lès-Nancy, France*, and Juncheng Wei, *Chinese University of Hong Kong, Shatin, Hong Kong*

Contents: Introduction; L^∞ -bounded solutions; Smooth domains and extensions of solutions to elliptic equations; Exhaustion of the concentration points; A first upper-estimate; A sharp upper-estimate; Asymptotic estimates in $C^1(\Omega)$; Convergence to singular harmonic functions; Estimates of the interior blow-up rates; Estimates of the boundary blow-up rates; Proof of Theorems 1 and 2; Appendix A. Construction and estimates on the Green's function; Appendix B. Projection of the test functions; Bibliography.

Memoirs of the American Mathematical Society, Volume 218, Number 1027

June 2012, 105 pages, Softcover, ISBN: 978-0-8218-6909-3, LC 2012007214, 2010 *Mathematics Subject Classification*: 35J20, 35J60, **Individual member US\$42**, List US\$70, Institutional member US\$56, Order code MEMO/218/1027



Regularity of Free Boundaries in Obstacle-Type Problems

Arshak Petrosyan, *Purdue University, West Lafayette, IN*,
Henrik Shahgholian, *Royal Institute of Technology, Stockholm, Sweden*, and
Nina Uraltseva, *St. Petersburg University, Russia*

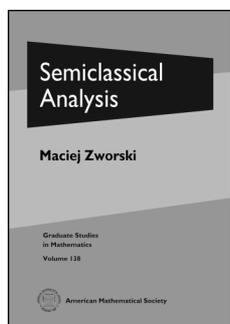
The regularity theory of free boundaries flourished during the late 1970s and early 1980s and had a major impact in several areas of mathematics, mathematical physics, and industrial mathematics, as well as in applications. Since then the theory continued to evolve. Numerous new ideas, techniques, and methods have been developed, and challenging new problems in applications have arisen. The main intention of the authors of this book is to give a coherent introduction to the study of the regularity properties of free boundaries for a particular type of problems, known as obstacle-type problems. The emphasis is on the methods developed in the past two decades. The topics include optimal regularity, nondegeneracy, rescalings and blowups, classification of global solutions, several types of monotonicity formulas, Lipschitz, C^1 , as well as higher regularity of the free boundary, structure of the singular set, touch of the free and fixed boundaries, and more.

The book is based on lecture notes for the courses and mini-courses given by the authors at various locations and should be accessible to advanced graduate students and researchers in analysis and partial differential equations.

Contents: Introduction; Model problems; Optimal regularity of solutions; Preliminary analysis of the free boundary; Regularity of the free boundary: first results; Global solutions; Regularity of the free boundary: uniform results; The singular set; Touch with the fixed boundary; The thin obstacle problem; Bibliography; Notation; Index.

Graduate Studies in Mathematics, Volume 136

August 2012, approximately 225 pages, Hardcover, ISBN: 978-0-8218-8794-3, LC 2012010200, 2010 *Mathematics Subject Classification*: 35R35, **AMS members US\$43.20**, List US\$54, Order code GSM/136



Semiclassical Analysis

Maciej Zworski, *University of California, Berkeley, CA*

This book is an excellent, comprehensive introduction to semiclassical analysis. I believe it will become a standard reference for the subject.

—**Alejandro Uribe**, *University of Michigan*

Semiclassical analysis provides PDE techniques based on the *classical-quantum* (particle-wave) correspondence. These techniques

include such well-known tools as geometric optics and the Wentzel–Kramers–Brillouin approximation. Examples of problems studied in this subject are high energy eigenvalue asymptotics and effective dynamics for solutions of evolution equations. From the mathematical point of view, semiclassical analysis is a branch of *microlocal analysis* which, broadly speaking, applies *harmonic analysis* and *symplectic geometry* to the study of linear and nonlinear PDE. The book is intended to be a graduate level text introducing readers to semiclassical and microlocal methods in PDE. It is augmented in later chapters with many specialized advanced topics which provide a link to current research literature.

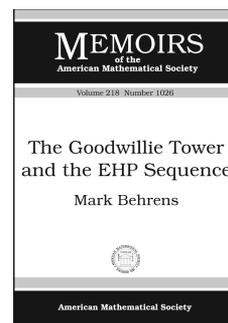
This item will also be of interest to those working in analysis.

Contents: Introduction; *Basic theory*: Symplectic geometry and analysis; Fourier transform, stationary phase; Semiclassical quantization; *Applications to partial differential equations*: Semiclassical defect measures; Eigenvalues and eigenfunctions; Estimates for solutions of PDE; *Advanced theory and applications*: More on the symbol calculus; Changing variables; Fourier integral operators; Quantum and classical dynamics; Normal forms; The FBI transform; *Semiclassical analysis on manifolds*: Manifolds; Quantum ergodicity; *Appendices*: Notation; Differential forms; Functional analysis; Fredholm theory; Bibliography; Index.

Graduate Studies in Mathematics, Volume 138

August 2012, approximately 429 pages, Hardcover, ISBN: 978-0-8218-8320-4, LC 2012010649, 2010 *Mathematics Subject Classification*: 35Q40, 81Q20, 35S05, 35S30, 35P20, 81S10, **AMS members US\$60**, List US\$75, Order code GSM/138

Geometry and Topology



The Goodwillie Tower and the EHP Sequence

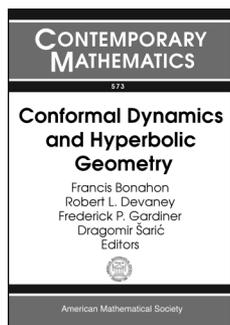
Mark Behrens, *Massachusetts Institute of Technology, Cambridge, MA*

Contents: Introduction; Dyer–Lashof operations and the identity functor; The Goodwillie tower of the EHP sequence; Goodwillie filtration and the P map; Goodwillie differentials and Hopf

invariants; EHPSS differentials; Calculations in the 2-primary Toda range; Appendix A. Transfinite spectral sequences associated to towers; Bibliography.

Memoirs of the American Mathematical Society, Volume 218, Number 1026

June 2012, 90 pages, Softcover, ISBN: 978-0-8218-6902-4, LC 2012007213, 2010 *Mathematics Subject Classification*: 55Q40; 55Q15, 55Q25, 55S12, **Individual member US\$40.20**, List US\$67, Institutional member US\$53.60, Order code MEMO/218/1026



Conformal Dynamics and Hyperbolic Geometry

Francis Bonahon, *University of Southern California, Los Angeles, CA*, **Robert L. Devaney**, *Boston University, MA*, **Frederick P. Gardiner**, *Brooklyn College, CUNY, New York, NY*, and *Graduate School and University Center of CUNY, New York, NY*, and **Dragomir Šarić**, *Queens College, CUNY, Flushing, NY*, and *Graduate School and University Center of CUNY, New York, NY*, Editors

This volume contains the proceedings of the Conference on Conformal Dynamics and Hyperbolic Geometry, held October 21–23, 2010, in honor of Linda Keen’s 70th birthday.

This volume provides a valuable introduction to problems in conformal and hyperbolic geometry and one dimensional, conformal dynamics. It includes a classic expository article by John Milnor on the structure of hyperbolic components of the parameter space for dynamical systems arising from the iteration of polynomial maps in the complex plane. In addition there are foundational results concerning Teichmüller theory, the geometry of Fuchsian and Kleinian groups, domain convergence properties for the Poincaré metric, elaboration of the theory of the universal solenoid, the geometry of dynamical systems acting on a circle, and realization of Thompson’s group as a mapping class group for a uniformly asymptotically affine circle endomorphism.

The portion of the volume dealing with complex dynamics will appeal to a diverse group of mathematicians. Recently many researchers working in a wide range of topics, including topology, algebraic geometry, complex analysis, and dynamical systems, have become involved in aspects of this field.

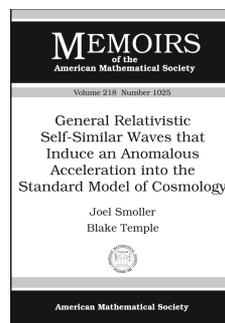
This item will also be of interest to those working in analysis.

Contents: **M. Beck**, **Y. Jiang**, and **S. Mitra**, Normal families and holomorphic motions over infinite dimensional parameter spaces; **R. Chamanara** and **D. Šarić**, Elementary moves and the modular group of the compact solenoid; **L. DeMarco**, Combinatorics and topology of the shift locus; **R. L. Devaney**, Dynamics of $z^n + \lambda/z^n$; Why the case $n = 2$ is crazy; **C. J. Earle** and **A. Marden**, On holomorphic families of Riemann surfaces; **F. P. Gardiner** and **Y. Jiang**, Circle endomorphisms, dual circles and Thompson’s group; **J. Hu**, **F. G. Jimenez**, and **O. Muzician**, Rational maps with half symmetries, Julia sets, and multibrot sets in parameter planes; **N. Lakić** and **G. Markowsky**, The rate of convergence of the hyperbolic density on sequences of domains; **S. Maloni**, The asymptotic directions of pleating rays in the Maskit embedding; **J. Milnor** and **A. Poirier**, Hyperbolic components with an appendix by **A. Poirier**; **C. Wolf**, On barycenter entropy for rational maps; **S. Yuan**, Parameter plane of a family of meromorphic functions with two asymptotic values.

Contemporary Mathematics, Volume 573

August 2012, 256 pages, Softcover, ISBN: 978-0-8218-5348-1, LC 2012011231, 2010 *Mathematics Subject Classification*: 30Cxx, 32Gxx, 37Dxx, 37Fxx, **AMS members US\$68.80**, List US\$86, Order code CONM/573

Mathematical Physics



General Relativistic Self-Similar Waves that Induce an Anomalous Acceleration into the Standard Model of Cosmology

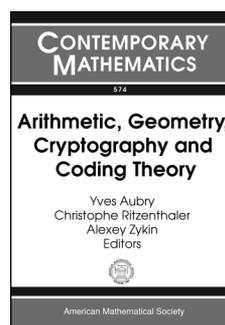
Joel Smoller, *University of Michigan, Ann Arbor, MI*, and **Blake Temple**, *University of California, Davis, CA*

Contents: Introduction; Self-similar coordinates for the $k = 0$ FRW spacetime; The expanding wave equations; Canonical co-moving coordinates and comparison with the $k \neq 0$ FRW spacetimes; Leading order corrections to the standard model induced by the expanding waves; A foliation of the expanding wave spacetimes into flat spacelike hypersurfaces with modified scale factor $R(t) = t^a$; Expanding wave corrections to the standard model in approximate co-moving coordinates; Redshift vs luminosity relations and the anomalous acceleration; Appendix: The mirror problem; Concluding remarks; Bibliography.

Memoirs of the American Mathematical Society, Volume 218, Number 1025

June 2012, 69 pages, Softcover, ISBN: 978-0-8218-5358-0, LC 2012007080, 2010 *Mathematics Subject Classification*: 34A05, 76L05, 83F05, 85A40, **Individual member US\$34.80**, List US\$58, Institutional member US\$46.40, Order code MEMO/218/1025

Number Theory



Arithmetic, Geometry, Cryptography and Coding Theory

Yves Aubry, *Université du Sud Toulon-Var, La Garde Cedex, France*, **Christophe Ritzenthaler**, *Institut de Mathématiques de Luminy, Marseille, France*, and **Alexey Zykin**, *State University–Higher School of Economics, Moscow, Russia*, and *Institute for Information Transmission Problems, Moscow, Russia*, Editors

This volume contains the proceedings of the 13th AGC²T conference, held March 14–18, 2011, in Marseille, France, together with the

proceedings of the 2011 Geocrypt conference, held June 19–24, 2011, in Bastia, France.

The original research articles contained in this volume cover various topics ranging from algebraic number theory to Diophantine geometry, curves and abelian varieties over finite fields and applications to codes, boolean functions or cryptography.

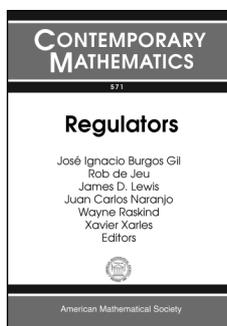
The international conference AGC²T, which is held every two years in Marseille, France, has been a major event in the area of applied arithmetic geometry for more than 25 years.

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

Contents: C. Arène and R. Cosset, Construction of a k -complete addition law on Jacobians of hyperelliptic curves of genus two; R. Blache, Number of points in an Artin-Schreier covering; E. Féraud, R. Oyono, and F. Rodier, Some more functions that are not APN infinitely often. The case of Gold and Kasami exponents; S. Fukasawa, M. Homma, and S. J. Kim, Rational curves with many rational points over a finite field; S. R. Ghorpade and S. Ram, Enumeration of splitting subspaces over finite fields; S. Haloui and V. Singh, The characteristic polynomials of abelian varieties of dimension 4 over finite fields; E. W. Howe, New bounds on the maximum number of points on genus-4 curves over small finite fields; G. M. Kyureghyan, F. Özbudak, and A. Pott, Some planar maps and related function fields; E. Leduq, New families of APN functions in characteristic 3 or 5; P. Lisoněk, Identities for Kloosterman sums and modular curves; A. Ostafe and I. Shparlinski, Degree growth, linear independence and periods of a class of rational dynamical systems; E. Rökæus, Computer search for curves with many points among abelian covers of genus 2 curves; S. Rybakov, The groups of points on abelian surfaces over finite fields; B. Smith, Computing low-degree isogenies in genus 2 with the Dolgachev-Lehavi method; Yu. G. Zarhin, Hodge classes on certain hyperelliptic Prymians.

Contemporary Mathematics, Volume 574

August 2012, approximately 188 pages, Softcover, ISBN: 978-0-8218-7572-8, 2010 *Mathematics Subject Classification*: 11G10, 11G20, 11M38, 11R42, 11T06, 11T71, 14G10, 14G15, 14G50, 14Q05, **AMS members US\$59.20**, List US\$74, Order code CONM/574



Regulators

José Ignacio Burgos Gil, *ICMAT, Madrid, Spain*, Rob de Jeu, *VU University Amsterdam, The Netherlands*, James D. Lewis, *University of Alberta, Edmonton, AB, Canada*, Juan Carlos Naranjo, *University of Barcelona, Spain*, Wayne Raskind, *Arizona State University, Tempe, AZ*, and Xavier Xarles, *Universitat Autònoma de Barcelona, Catalunya, Spain*, Editors

This volume contains the proceedings of the Regulators III Conference, held from July 12 to July 22, 2010, in Barcelona, Spain.

Regulators can be thought of as realizations from motivic cohomology, which is very difficult to compute, to more computable theories such as Hodge, Betti, l -adic, and Deligne cohomology. It is a very intricate subject that thrives on its interaction with algebraic

K -theory, arithmetic geometry, number theory, motivic cohomology, Hodge theory and mathematical physics.

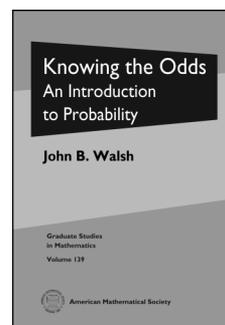
The articles in this volume are a reflection of the various approaches to this subject, such as results on motivic cohomology, descriptions of regulators, a revisiting of a number of fundamental conjectures (such as new results pertaining to the Hodge and standard conjectures), and more.

Contents: M. Asakura, Quintic surface of p -adic local fields with infinite p -primary torsion in the Chow group of 0-cycles; A. Beilinson, A remark on primitive cycles and Fourier-Radon transform; A. Beilinson, Remarks on Grothendieck's standard conjectures; A. Besser, On the derivative of a normal function associated with a Deligne cohomology class; J.-L. Colliot-Thélène, Quelque cas d'annulation du troisième groupe de cohomologie non ramifiée; F. Déglise, Coniveau filtration and mixed motives; F. Déglise, Around the Gysin triangle I; C. Deninger, Regulators, entropy and infinite determinants; M. Felisatti and F. Neumann, Secondary theories for étale groupoids; T. Geisser, Finite generation conjectures for motivic cohomology theories over finite fields; D. Hébert, Le foncteur de filtration par le poids; R. Joshua, K -theory and G -theory of DG stacks; A. Del Padrone and C. Pedrini, Derived categories of coherent sheaves and motives of K3 surfaces; W. Raskind, Serre-Tate parameters and jacobian inversion for rigid Calabi-Yau 3-folds; A. Rosenschon and V. Srinivas, An example concerning specialization of torsion subgroups of Chow groups; J. Wildeshaus, Motivic intersection complex.

Contemporary Mathematics, Volume 571

June 2012, 276 pages, Softcover, ISBN: 978-0-8218-5322-1, LC 2012005136, 2010 *Mathematics Subject Classification*: 14Cxx, 14Dxx, 14Fxx, 14Gxx, 19Dxx, 19Exx, 19Fxx, 11Gxx, 11Sxx, 11Mxx, **AMS members US\$77.60**, List US\$97, Order code CONM/571

Probability and Statistics



Knowing the Odds

An Introduction to Probability

John B. Walsh, *University of British Columbia, Vancouver, BC, Canada*

John Walsh, one of the great masters of the subject, has written a superb book on probability. It covers at a leisurely pace all the important topics that students need to know, and provides excellent examples. I

regret his book was not available when I taught such a course myself, a few years ago.

—Ioannis Karatzas, *Columbia University*

In this wonderful book, John Walsh presents a panoramic view of Probability Theory, starting from basic facts on mean, median and mode, continuing with an excellent account of Markov chains and martingales, and culminating with Brownian motion. Throughout, the author's personal style is apparent; he manages to combine rigor with an emphasis on the key ideas so the reader never loses sight of the forest by being surrounded by too many trees. As noted in the preface, "To teach a course with pleasure, one should learn at the same time." Indeed, almost all instructors will learn something

new from the book (e.g. the potential-theoretic proof of Skorokhod embedding) and at the same time, it is attractive and approachable for students.

—**Yuval Peres, Microsoft**

With many examples in each section that enhance the presentation, this book is a welcome addition to the collection of books that serve the needs of advanced undergraduate as well as first year graduate students. The pace is leisurely which makes it more attractive as a text.

—**Srinivasa Varadhan, Courant Institute, New York**

This book covers in a leisurely manner all the standard material that one would want in a full year probability course with a slant towards applications in financial analysis at the graduate or senior undergraduate honors level. It contains a fair amount of measure theory and real analysis built in but it introduces sigma-fields, measure theory, and expectation in an especially elementary and intuitive way. A large variety of examples and exercises in each chapter enrich the presentation in the text.

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

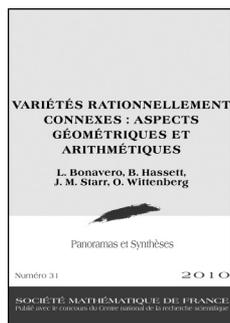
Contents: Probability spaces; Random variables; Expectations II: The general case; Convergence; Laws of large numbers; Convergence in distribution and the CLT; Markov chains and random walks; Conditional expectations; Discrete-parameter Martingales; Brownian motion; Bibliography; Index.

Graduate Studies in Mathematics, Volume 139

September 2012, approximately 452 pages, Hardcover, ISBN: 978-0-8218-8532-1, 2010 *Mathematics Subject Classification:* 60-01, **AMS members US\$60**, List US\$75, Order code GSM/139

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Variétés Rationnellement Connexes: Aspects Géométriques et Arithmétiques

L. Bonavero, Université de Grenoble 1, Saint-Martin d'Hères, France, B. Hassett, Rice University, Houston, TX, J. M. Starr, Stony Brook University, NY, and O. Wittenberg, École Normale Supérieure, Paris, France

Over the last twenty years, rationally connected varieties have played an important role in the classification program of higher dimensional

varieties. Over the last ten years, a number of their arithmetic properties have been discovered. It is the goal of this volume to report on many of these advances, as well as on a number of open questions.

This volume gathers the contributions of the four speakers at the CNRS/SMF workshop “Etats de la Recherche”, which was organized by J.-L. Colliot-Thélène, O. Debarre, and A. Höring in Strasbourg in May 2008.

L. Bonavero discusses the fundamental geometric properties of rationally connected varieties and also offers an opening on modern birational classification techniques. O. Wittenberg surveys the arithmetic properties of rationally connected varieties, mostly over local fields and over finite fields (deformation techniques and cohomological techniques). B. Hassett reports on the weak approximation property for families of rationally connected varieties over a complex curve.

The emerging notion of simply rationally connected variety is at the heart of J. Starr’s contribution. Starr’s paper starts with a study of sections of families of such varieties over a complex surface and culminates with a partly simplified proof of the theorem by de A. J. Jong, J. Starr, and X. He: Serre’s Conjecture II for principal homogeneous spaces holds over function fields in two variables over the complex field.

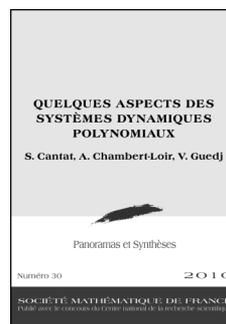
This item will also be of interest to those working in number theory.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: **J.-L. Colliot-Thélène**, Introduction; **O. Wittenberg**, La connexité rationnelle en arithmétique; **L. Bonavero**, Variétés rationnellement connexes sur un corps algébriquement clos; **J. M. Starr**, Rational points of rationally simply connected varieties; **B. Hassett**, Weak approximation and rationally connected varieties over function fields of curves.

Panoramas et Synthèses, Number 31

February 2012, 221 pages, Softcover, ISBN: 978-2-85629-339-3, 2010 *Mathematics Subject Classification:* 11G25, 12G05, 14C15, 14D05, 14D22, 14E05, 14E30, 14G05, 14J40, 14J45, 14M20, 14M22, **Individual member US\$54**, List US\$60, Order code PASY/31



Quelques Aspects des Systèmes Dynamiques Polynomiaux

S. Cantat and A. Chambert-Loir, Université de Rennes I, France, and V. Guedj, Université Aix-Marseille 1, France

This book is concerned with the dynamics of rational transformations of projective varieties and meromorphic transformations of compact Kähler manifolds. Four main viewpoints are developed.

The first article describes the geometry of the varieties which admit a rational transformation with interesting dynamical properties; the geometry constrains the existence of such dynamical systems, but interesting examples with rich dynamics are described.

The second article explains how complex analysis, potential theory, and Hodge theory can be married with methods from dynamical

systems to describe the stochastic properties of meromorphic transformations of Kähler manifolds. Then, arithmetic aspects of algebraic dynamical systems are described in a third article; in particular, equidistribution theorems in diophantine geometry and dynamical systems are analyzed and compared.

The fourth article describes the basics of p -adic dynamics in one variable.

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

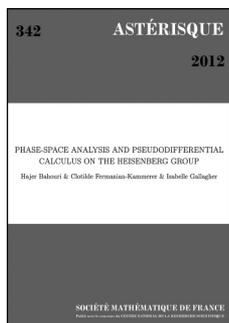
A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: S. Cantat, Introduction; S. Cantat, Quelques aspects des systèmes dynamiques polynomiaux (Existence, exemples, rigidité); V. Guedj, Propriétés ergodiques des applications rationnelles; A. Chambert-Loir, Théorèmes d'équidistribution pour les systèmes dynamiques d'origine arithmétique; S. Cantat and A. Chambert-Loir, Dynamique p -adique (d'après les exposés de Jean-Christophe Yoccoz).

Panoramas et Synthèses, Number 30

February 2012, 341 pages, Softcover, ISBN: 978-2-85629-338-6, 2010 *Mathematics Subject Classification*: 14E07, 14J50, 32H50, 11-02, 11G50, 14K15, 37P30, 37F10, 32U15, 32U40, **Individual member US\$54**, List US\$60, Order code PASY/30

Differential Equations



Phase-Space Analysis and Pseudodifferential Calculus on the Heisenberg Group

Hajer Bahouri and Clotilde Fermanian-Kammerer, *Université Paris-Est Créteil, France*, and Isabelle Gallagher, *Université Paris Diderot, France*

A class of pseudodifferential operators on the Heisenberg group is defined. As it should be, this class is an algebra containing the class of differential operators. Furthermore, those pseudodifferential operators act continuously on Sobolev spaces and the loss of derivatives may be controlled by the order of the operator. Although a large number of works have been devoted in the past to the construction and the study of algebras of variable-coefficient operators, including some very interesting works on the Heisenberg group, the authors' approach is different, and in particular puts into light microlocal directions and completes, with the Littlewood-Paley theory initiated in 2000 by Bahouri, Gérard, and Xu: a microlocal analysis of the Heisenberg group.

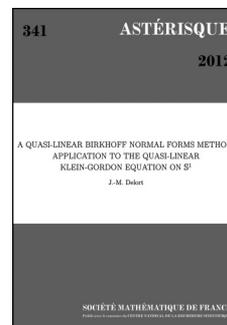
This item will also be of interest to those working in analysis.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: Introduction and main results; Fundamental properties of pseudodifferential operators; The algebra of pseudodifferential operators; Littlewood-Paley theory; The action of pseudodifferential operators on Sobolev spaces; Appendix A. Some useful results on the Heisenberg group; Appendix B. Weyl-Hörmander symbolic calculus on the Heisenberg group; Bibliography.

Astérisque, Number 342

February 2012, 127 pages, Softcover, ISBN: 978-2-85629-334-8, 2010 *Mathematics Subject Classification*: 35S05, 43A80, 35A27, **Individual member US\$46.80**, List US\$52, Order code AST/342



A Quasi-Linear Birkhoff Normal Forms Method. Application to the Quasi-Linear Klein-Gordon Equation on S^1

J.-M. Delort, *Université Paris 13, Villetaneuse, France*

Consider a nonlinear Klein-Gordon equation on the unit circle, with smooth data of size $\epsilon \rightarrow 0$. A solution u which, for any $\kappa \in \mathbb{N}$, may be extended as a smooth solution on a time-interval $] -c_\kappa \epsilon^{-\kappa}, c_\kappa \epsilon^{-\kappa} [$ for some $c_\kappa > 0$ and for $0 < \epsilon < \epsilon_\kappa$, is called an almost global solution. It is known that when the nonlinearity is a polynomial depending only on u , and vanishing at order at least 2 at the origin, any smooth small Cauchy data generate, as soon as the mass parameter in the equation stays outside a subset of zero measure of \mathbb{R}_+^* , an almost global solution, whose Sobolev norms of higher order stay uniformly bounded. The goal of this book is to extend this result to general Hamiltonian quasi-linear nonlinearities. These are the only *Hamiltonian* nonlinearities that depend not only on u but also on its space derivative. To prove the main theorem, the author develops a Birkhoff normal form method for quasi-linear equations.

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

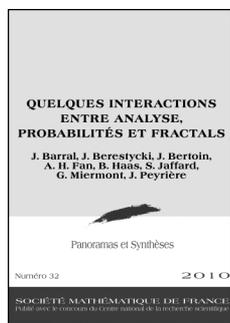
A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: Introduction; Almost global existence; Symbolic calculus; Composition and Poisson brackets; Symplectic reductions; Proof of almost global existence; Bibliography; Index.

Astérisque, Number 341

February 2012, 113 pages, Softcover, ISBN: 978-2-85629-335-5, 2010 *Mathematics Subject Classification*: 35L70, 35B45, 37K05, 35S50, **Individual member US\$40.50**, List US\$45, Order code AST/341

Number Theory



Quelques Interactions Entre Analyse, Probabilités et Fractals

J. Barral, *Université Paris 13, Villetaneuse, France*, **J. Berestycki** and **J. Bertoin**, *Université Pierre et Marie Curie, Paris, France*, **A. H. Fan**, *Université de Picardie, Amiens, France*, **B. Haas**, *Université Paris-Dauphine, France*, **S. Jaffard**, *Université Paris Est Créteil, France*, **G. Miermont**, *Université Paris-Sud Bâtiment, Orsay, France*, and **J. Peyrière**, *Université Paris-Sud 11, Orsay, France*

Following the seminal contributions of Benoît Mandelbrot in the 1970s, concepts derived from fractal geometry gave a new impulse to several areas of mathematics. The goal of this volume is to present syntheses on two subjects where important advances occurred in the last 15 years: multiplicative processes and fragmentation. One arose from harmonic analysis (Riesz products) and the other from a probabilistic model proposed by N. Kolmogorov to explain experimental observations on rock fragmentation. However, they share analogies and use common mathematical tools issued from the study of random fractals.

The first paper introduces basic concepts in fractal analysis. It starts with the description of the historical developments that led to their introduction and interactions. The definitions of fractional dimensions are introduced, and pertinent tools in geometric measure theory are recalled. Examples of multifractal functions and measures are studied. Finally, ubiquity systems, which play an increasing role in multifractal analysis, are introduced.

The second paper deals with fine geometric properties of measures obtained as limits of multiplicative processes. It starts by showing in which contexts they appear and by describing their key properties. The notions of dimension of a measure and of multifractal analysis are introduced in a general setting and illustrated on the aforementioned examples. Finally, the efficiency of these measures for the description of percolation on trees, and for dynamical or random coverings, is shown.

The third paper describes the time evolution of objects that disaggregate in a random way, and the fragments of which evolve independently. A statistical self-similarity assumption endows them with a structure of random fractal. The foundations of fragmentation theory are given, and the laws of these processes are shown to be characterized by a self-similarity index, a dislocation measure, and an erosion coefficient. Then, a random tree endowed with a distance is considered, which leads to a description of the genealogy of the process. Finally, the speed with which the fragment containing a given point decays is studied. This leads to the introduction of a multifractal spectrum of speeds of fragmentation.

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

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

Contents: S. Jaffard, Introduction; J. Barral, A. H. Fan, and J. Peyrière, Mesures engendrées par multiplications; J. Berestycki, J. Bertoin, B. Haas, and G. Miermont, Quelques aspects fractals des fragmentations aléatoires.

Panoramas et Synthèses, Number 32

February 2012, 243 pages, Softcover, ISBN: 978-2-85629-313-3, 2010 *Mathematics Subject Classification:* 11J83, 11K06, 26A15, 26A30, 28A78, 28A80, 37B40, 43A25, 60G18, 60J80, **Individual member US\$54**, List US\$60, Order code PASY/32