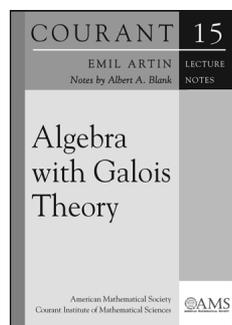


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Algebra and Algebraic Geometry



Algebra with Galois Theory

Emil Artin
Notes by Albert A. Blank

The present text was first published in 1947 by the Courant Institute of Mathematical Sciences of New York University. Published under the title *Modern Higher Algebra. Galois Theory*, it was based on lectures by Emil Artin and written by Albert A. Blank. This volume

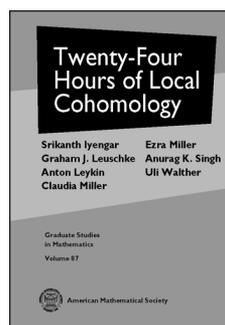
became one of the most popular in the series of lecture notes published by Courant. Many instructors used the book as a textbook, and it was popular among students as a supplementary text as well as a primary textbook. Because of its popularity, Courant has republished the volume under the new title *Algebra with Galois Theory*.

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

Contents: Groups; Rings and fields; Polynomials. Factorization into primes. Ideals; Solution of the general equation of n th degree. Residue classes. Extension fields. Isomorphisms; Galois theory; Polynomials with integral coefficients; The theory of equations.

Courant Lecture Notes, Volume 15

December 2007, 126 pages, Softcover, ISBN: 978-0-8218-4129-7, LC 2007060799, 2000 *Mathematics Subject Classification*: 12-01, 12F10, **AMS members** US\$23, List US\$29, Order code CLN/15



Twenty-Four Hours of Local Cohomology

Srikanth B. Iyengar, *University of Nebraska, Lincoln, NE*, **Graham J. Leuschke**, *Syracuse University, NY*, **Anton Leykin**, *Institute for Mathematics and Its Applications, Syracuse, NY*, **Claudia Miller**, *Syracuse University, NY*, **Ezra Miller**, *University of Minnesota, Minneapolis, MN*, **Anurag K. Singh**, *University of Utah, Salt Lake City, UT*, and **Uli Walther**, *Purdue University, West Lafayette, IN*

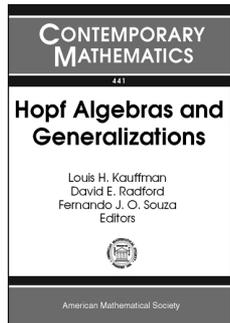
This book is aimed to provide an introduction to local cohomology which takes cognizance of the breadth of its interactions with other areas of mathematics. It covers topics such as the number of defining equations of algebraic sets, connectedness properties of algebraic sets, connections to sheaf cohomology and to de Rham cohomology, Gröbner bases in the commutative setting as well as for D -modules, the Frobenius morphism and characteristic p methods, finiteness properties of local cohomology modules, semigroup rings and polyhedral geometry, and hypergeometric systems arising from semigroups.

The book begins with basic notions in geometry, sheaf theory, and homological algebra leading to the definition and basic properties of local cohomology. Then it develops the theory in a number of different directions, and draws connections with topology, geometry, combinatorics, and algorithmic aspects of the subject.

Contents: Basic notions; Cohomology; Resolutions and derived functors; Limits; Gradings, filtrations, and Gröbner bases; Complexes from a sequence of ring elements; Local cohomology; Auslander-Buchsbaum formula and global dimension; Depth and cohomological dimension; Cohen-Macaulay rings; Gorenstein rings; Connections with sheaf cohomology; Projective varieties; The Hartshorne-Lichtenbaum vanishing theorem; Connectedness; Polyhedral applications; D -modules; Local duality revisited; De Rham cohomology; Local cohomology over semigroup rings; The Frobenius endomorphism; Curious examples; Algorithmic aspects of local cohomology; Holonomic rank and hypergeometric systems; Injective modules and Matlis duality; Bibliography; Index.

Graduate Studies in Mathematics, Volume 87

December 2007, 282 pages, Hardcover, ISBN: 978-0-8218-4126-6, LC 2007060786, 2000 *Mathematics Subject Classification*: 13A35, 13D45, 13H10, 13N10, 14B15; 13H05, 13P10, 13F55, 14F40, 55N30, AMS members US\$44, List US\$55, Order code GSM/87



Hopf Algebras and Generalizations

Louis H. Kauffman and **David E. Radford**, *University of Illinois at Chicago, IL*, and **Fernando J. O. Souza**, *Universidade Federal de Pernambuco, Recife, PE, Brazil*, Editors

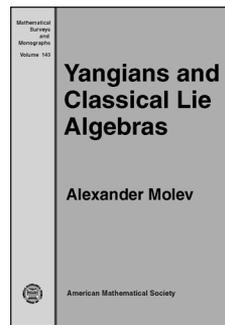
Hopf algebras have proved to be very interesting structures with deep connections to various areas of mathematics, particularly through quantum groups. Indeed, the study of Hopf algebras, their representations, their generalizations, and the categories related to all these objects has an interdisciplinary nature. It finds methods, relationships, motivations and applications throughout algebra, category theory, topology, geometry, quantum field theory, quantum gravity, and also combinatorics, logic, and theoretical computer science.

This volume portrays the vitality of contemporary research in Hopf algebras. Altogether, the articles in the volume explore essential aspects of Hopf algebras and some of their best-known generalizations by means of a variety of approaches and perspectives. They make use of quite different techniques that are already consolidated in the area of quantum algebra. This volume demonstrates the diversity and richness of its subject. Most of its papers introduce the reader to their respective contexts and structures through very expository preliminary sections.

Contents: **B. Day**, **E. Panchadcharam**, and **R. Street**, Lax braidings and the Lax centre; **G. Karaali**, Dynamical quantum groups—The super story; **Y. Kashina**, Groups of grouplike elements of a semisimple Hopf algebra and its dual; **S.-H. Ng** and **P. Schauenburg**, Higher Frobenius-Schur indicators for pivotal categories; **F. Panaite**, Doubles of (quasi) Hopf algebras and some examples of quantum groupoids and vertex groups related to them; **P. Schauenburg**, Central braided Hopf algebras; **M. D. Staic**, A note on anti-Yetter-Drinfeld modules; **M. Takeuchi**, Representations of the Hopf algebra $U(n)$.

Contemporary Mathematics, Volume 441

October 2007, 174 pages, Softcover, ISBN: 978-0-8218-3820-4, LC 2007060772, 2000 *Mathematics Subject Classification*: 16W30, 16W35, 16W50, 16W55, 16G99, 17B37, 18D10, 18D35, 20G42, 81R50, AMS members US\$47, List US\$59, Order code CONM/441



Yangians and Classical Lie Algebras

Alexander Molev, *University of Sydney, Australia*

The Yangians and twisted Yangians are remarkable associative algebras taking their origins from the work of St. Petersburg's school of mathematical physics in the 1980s. The general definitions were given in subsequent work

of Drinfeld and Olshansky, and these algebras have since found numerous applications in and connections with mathematical physics, geometry, representation theory, and combinatorics.

The book is an introduction to the theory of Yangians and twisted Yangians, with a particular emphasis on the relationship with the classical matrix Lie algebras. A special algebraic technique, the R -matrix formalism, is developed and used as the main instrument for describing the structure of Yangians. A detailed exposition of the highest weight theory and the classification theorems for finite-dimensional irreducible representations of these algebras is given.

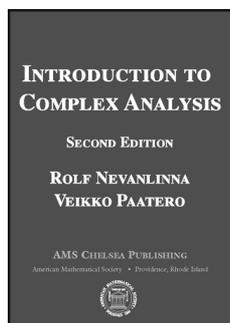
The Yangian perspective provides a unifying picture of several families of Casimir elements for the classical Lie algebras and relations between these families. The Yangian symmetries play a key role in explicit constructions of all finite-dimensional irreducible representations of the orthogonal and symplectic Lie algebras via weight bases of Gelfand-Tsetlin type.

Contents: Yangian for \mathfrak{gl}_N ; Twisted Yangians; Irreducible representations of $Y(\mathfrak{gl}_N)$; Irreducible representations of $Y(\mathfrak{g}_N)$; Gelfand-Tsetlin bases for representations of $Y(\mathfrak{gl}_N)$; Tensor products of evaluation modules for $Y(\mathfrak{gl}_N)$; Casimir elements and Capelli identities; Centralizer construction; Weight bases for representations of \mathfrak{g}_N ; Bibliography; Index.

Mathematical Surveys and Monographs, Volume 143

November 2007, 400 pages, Hardcover, ISBN: 978-0-8218-4374-1, LC 2007060781, 2000 *Mathematics Subject Classification*: 17B37, 81R50; 17B10, 17B20, 81R10, 05E10, 05E15, AMS members US\$79, List US\$99, Order code SURV/143

Analysis



Introduction to Complex Analysis

Second Edition

Rolf Nevanlinna and Veikko Paatero

It really is a gem, both in terms of its table of contents and the level of discussion. The exercises also look very good.

—Clifford Earle, Cornell University

This book has a soul and has passion.

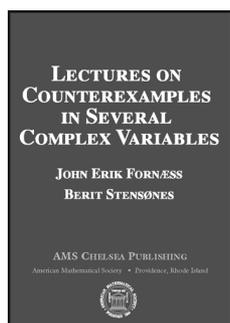
—William Abikoff, University of Connecticut

This classic book gives an excellent presentation of topics usually treated in a complex analysis course, starting with basic notions (rational functions, linear transformations, analytic function), and culminating in the discussion of conformal mappings, including the Riemann mapping theorem and the Picard theorem. The two quotes above confirm that the book can be successfully used as a text for a class or for self-study.

Contents: The concept of an analytic function; General properties of rational functions; Linear transformations; Mapping by rational functions of second order; The exponential function and its inverse. The general power; The trigonometric functions; Infinite series with complex terms; Integration in the complex domain. Cauchy's theorem; Cauchy's integral formula and its applications; The residue theorem and its applications; Harmonic functions; Analytic continuation; Entire functions; Periodic functions; The Euler Γ -function; The Riemann ζ -function; The theory of conformal mapping; Index.

AMS Chelsea Publishing

October 2007, 350 pages, Hardcover, ISBN: 978-0-8218-4399-4, LC 2007022850, 2000 *Mathematics Subject Classification*: 30-01, **AMS members US\$44**, List US\$49, Order code CHEL/310.H



Lectures on Counterexamples in Several Complex Variables

John Erik Fornæss and Berit Stensønes, *University of Michigan, Ann Arbor, MI*

Counterexamples are remarkably effective for understanding the meaning, and the

limitations, of mathematical results. Fornæss and Stensønes look at some of the major ideas of several complex variables by considering counterexamples to what might seem like reasonable variations or generalizations. The first part of the book reviews some of the basics of the theory, in a self-contained introduction to several complex variables. The counterexamples cover a variety of important topics: the Levi problem, plurisubharmonic functions,

Monge-Ampère equations, CR geometry, function theory, and the $\bar{\partial}$ equation.

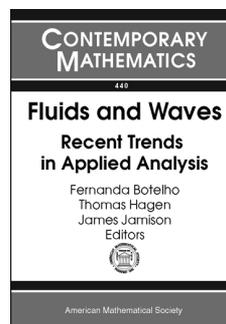
The book would be an excellent supplement to a graduate course on several complex variables.

Contents: Some notations and definitions; Holomorphic functions; Holomorphic convexity and domains of holomorphy; Stein manifolds; Subharmonic/Plurisubharmonic functions; Pseudoconvex domains; Invariant metrics; Biholomorphic maps; Counterexamples to smoothing of plurisubharmonic functions; Complex Monge Ampère equation; H^∞ -convexity; CR-manifolds; Pseudoconvex domains without pseudoconvex exhaustion; Stein neighborhood basis; Riemann domains over C^n ; The Kohn-Nirenberg example; Peak points; Bloom's example; D'Angelo's example; Integral manifolds; Peak sets for $A(D)$; Peak sets. Steps 1-4; Sup-norm estimates for the $\bar{\partial}$ -equation; Sibony's $\bar{\partial}$ -example; Hypoellipticity for $\bar{\partial}$; Inner functions; Large maximum modulus sets; Zero sets; Nontangential boundary limits of functions in $H^\infty(\mathbb{B}^n)$; Wermer's example; The union problem; Riemann domains; Runge exhaustion; Peak sets in weakly pseudoconvex boundaries; The Kobayashi metric; Bibliography.

AMS Chelsea Publishing

November 2007, 247 pages, Hardcover, ISBN: 978-0-8218-4422-9, LC 2007026106, 2000 *Mathematics Subject Classification*: 32-01; 32D05, 32E05, 32A38, 32U05, 32V40, 32F45, **AMS members US\$35**, List US\$39, Order code CHEL/363.H

Applications



Fluids and Waves

Recent Trends in Applied Analysis

Fernanda Botelho, Thomas Hagen, and James Jamison, *University of Memphis, TN*, Editors

This volume contains a series of articles on wave phenomena and fluid dynamics, highlighting recent advances in these two areas of mathematics. The collection is based on lectures presented at the conference "Fluids and Waves—Recent Trends in Applied Analysis" and features a rich spectrum of mathematical techniques in analysis and applications to engineering, neuroscience, physics, and biology. The mathematical topics discussed range from partial differential equations, dynamical systems and stochastic processes, to areas of classical analysis.

This volume is intended as an introduction to major topics of interest and state-of-the-art analytical research in wave motion and fluid flows. It is helpful to junior mathematicians to stay abreast of new techniques and recent trends in these areas of mathematics. The articles here also provide a unique scientific basis for recent results and new links between current research themes. In summary, this book is a guide for experts in one field to the issues of the other, and will challenge graduate students to investigate these areas of analysis in further detail.

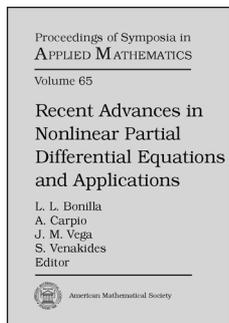
Contents: K. T. Andrews, S. Anderson, R. S. R. Menike, M. Shillor, R. Swaminathan, and J. Yuzwalk, Vibrations of a damageable

string; **G. Avalos** and **R. Triggiani**, The coupled PDE system arising in fluid/structure interaction. Part I: Explicit semigroup generator and its spectral properties; **V. Barbu**, **Z. Grujić**, **I. Lasiecka**, and **A. Tuffaha**, Existence of the energy-level weak solutions for a nonlinear fluid-structure interaction model; **A. Biswas** and **D. Swanson**, Gevrey regularity of solutions to the 3D Navier-Stokes equations; **P. C. Bressloff**, Stimulus-induced bumps in two-dimensional neural field theory; **S. N. Chandler-Wilde** and **M. Lindner**, Wave problems in unbounded domains: Fredholmness and the finite section method; **S. Coombes** and **M. R. Owen**, Exotic dynamics in a firing rate model of neural tissue with threshold accommodation; **M. H. Garzon**, **D. R. Blain**, and **M. West**, Embedded models of self-assembly of DNA complexes; **M. He**, A parameter property of integrodifferential equations with memory; **J. M. Lavine**, **E. C. Eckstein**, and **J. A. Goldstein**, Stochastic models with negative friction for intermittent rolling of biological mimetics; **J. A. H. Murdock**, Multi-parameter oscillatory connection functions in neural field models; **N. Popović**, Front speeds, cut-offs, and desingularization: A brief case study; **J. M. Rodriguez** and **M. H. Garzon**, Neural networks can learn to approximate autonomous flows; **C. M. Schober**, Rogue waves, non-Gaussian statistics and proximity to homoclinic data; **H. Schurz**, Nonlinear stochastic wave equations in \mathbb{R}^1 with power-law nonlinearity and additive space-time noise; **J. Tolosa**, The method of Lyapunov functions of two variables; **J. Zhu**, Analysis of map formation in visual perception.

Contemporary Mathematics, Volume 440

September 2007, 287 pages, Softcover, ISBN: 978-0-8218-4247-8, LC 2007060773, 2000 *Mathematics Subject Classification*: 76-06, 92-06, 76Dxx, 92Bxx; 92C20, 35Qxx, **AMS members US\$63**, List US\$79, Order code CONM/440

Differential Equations



Recent Advances in Nonlinear Partial Differential Equations and Applications

L. L. Bonilla, *Universidad Carlos III de Madrid, Leganés, Spain*,
A. Carpio, *Universidad Complutense de Madrid, Spain*,
J. M. Vega, *Universidad*

Politécnica de Madrid, Spain, and **S. Venakides**, *Duke University, Durham, NC*, Editors

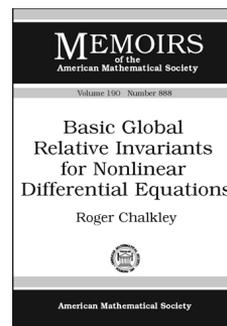
The articles of this book are written by leading experts in partial differential equations and their applications, who present overviews here of recent advances in this broad area of mathematics. The formation of shocks in fluids, modern numerical computation of turbulence, the breaking of the Einstein equations in a vacuum, the dynamics of defects in crystals, effects due to entropy in hyperbolic conservation laws, the Navier-Stokes and other limits of the Boltzmann equation, occupancy times for Brownian motion in a two dimensional wedge, and new methods of analyzing and solving integrable systems are some of this volume's subjects. The

reader will find an exposition of important advances without a lot of technicalities and with an emphasis on the basic ideas of this field.

Contents: **S. Klainerman**, Null hypersurfaces with finite curvature flux and a breakdown criterion in general relativity; **D. Christodoulou**, The formation of shocks in 3-dimensional fluids; **F. A. Grünbaum** and **C. McGrouther**, Occupation time for two dimensional Brownian motion in a wedge; **R. Buckingham**, **A. Tovbis**, **S. Venakides**, and **X. Zhou**, The semiclassical focusing nonlinear Schrödinger equation; **Y. Li**, An extension to a classical theorem of Liouville and applications; **A. S. Fokas**, From Green to Lax via Fourier; **J. Jimenez**, Untangling wall turbulence through direct simulations; **L. L. Bonilla** and **A. Carpio**, Defects, singularities and waves; **C. D. Levermore**, Fluid dynamics from Boltzmann equations; **F. Golse**, From the Boltzmann equation to the incompressible Navier-Stokes equations; **C. M. Dafermos**, Hyperbolic conservation laws with involutions and contingent entropies.

Proceedings of Symposia in Applied Mathematics, Volume 65

November 2007, 217 pages, Hardcover, ISBN: 978-0-8218-4211-9, LC 2007060794, 2000 *Mathematics Subject Classification*: 35Lxx, 35Qxx, 37-XX, 44-XX, 70-XX, 74-XX, 76-XX, 82-XX, 83-XX, **AMS members US\$39**, List US\$49, Order code PSAPM/65



Basic Global Relative Invariants for Nonlinear Differential Equations

Roger Chalkley, *University of Cincinnati, OH*

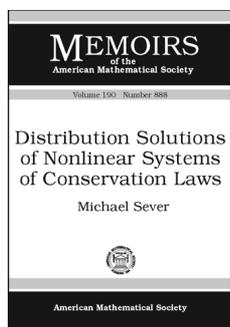
Contents: *Part 1. Foundations for a General Theory:* Introduction; The coefficients $c_{i,j}^*(z)$ of (1.3); The

coefficients $c_{i,j}^{**}(\zeta)$ of (1.5); Isolated results needed for completeness; Composite transformations and reductions; Related Laguerre-Forsyth canonical forms; *Part 2. The Basic Relative Invariants for $Q_m = 0$ when $m \geq 2$:* Formulas that involve $L_{i,j}(z)$; Basic semi-invariants of the first kind for $m \geq 2$; Formulas that involve $V_{i,j}(z)$; Basic semi-invariants of the second kind for $m \geq 2$; The existence of basic relative invariants; The uniqueness of basic relative invariants; Real-valued functions of a real variable; *Part 3. Supplementary Results:* Relative invariants via basic ones for $m \geq 2$; Results about Q_m as a quadratic form; Machine computations; The simplest of the Fano-type problems for (1.1); Paul Appell's condition of solvability for $Q_m = 0$; Appell's condition for $Q_2 = 0$ and related topics; Rational semi-invariants and relative invariants; *Part 4. Generalizations for $H_{m,n} = 0$:* Introduction to the equations $H_{m,n} = 0$; Basic relative invariants for $H_{1,n} = 0$ when $n \geq 2$; Laguerre-Forsyth forms for $H_{m,n} = 0$ when $m \geq 2$; Formulas for basic relative invariants when $m \geq 2$; Extensions of Chapter 7 to $H_{m,n} = 0$, when $m \geq 2$; Extensions of Chapter 9 to $H_{m,n} = 0$, when $m \geq 2$; Basic relative invariants for $H_{m,n} = 0$ when $m \geq 2$; *Additional Classes of Equations:* The class of equations specified by $y''(z)y'(z)$; Formulations of greater generality; Invariants for simple equations unlike (29.1); Bibliography; Index.

Memoirs of the American Mathematical Society, Volume 190, Number 888

October 2007, 365 pages, Softcover, ISBN: 978-0-8218-3991-1, LC 2007060779, 2000 *Mathematics Subject Classification*: 34A34;

34M15, **Individual member US\$59**, List US\$99, Institutional member US\$79, Order code MEMO/190/888



Distribution Solutions of Nonlinear Systems of Conservation Laws

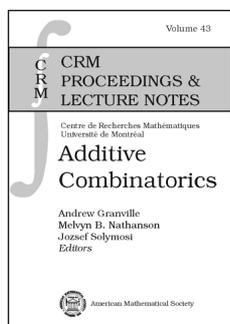
Michael Sever, *The Hebrew University, Jerusalem, Israel*

Contents: General distribution solutions; Delta-shocks; Singular shocks; Bibliography.

Memoirs of the American Mathematical Society, Volume 190, Number 889

October 2007, 163 pages, Softcover, ISBN: 978-0-8218-3990-4, LC 2007060778, 2000 *Mathematics Subject Classification*: 35L65, 35L67, **Individual member US\$40**, List US\$66, Institutional member US\$53, Order code MEMO/190/889

Discrete Mathematics and Combinatorics



Additive Combinatorics

Andrew Granville, *Université de Montréal, QC, Canada*, **Melvyn B. Nathanson**, *City University of New York, Lehman College, Bronx, NY*, and **József Solymosi**, *University of British Columbia, Vancouver, BC, Canada*, Editors

One of the most active areas in mathematics today is the rapidly emerging new topic of “additive combinatorics”. Building on Gowers’ use of the Freiman–Ruzsa theorem in harmonic analysis (in particular, his proof of Szemerédi’s theorem), Green and Tao famously proved that there are arbitrarily long arithmetic progressions of primes, and Bourgain and his co-authors have given non-trivial estimates for hitherto untouchably short exponential sums. There are further important consequences in group theory and in complexity theory and compelling questions in ergodic theory, discrete geometry and many other disciplines. The basis of the subject is not too difficult: it can be best described as the theory of adding together sets of numbers; in particular, understanding the structure of the two original sets if their sum is small. This book brings together key researchers from all of these different areas, sharing their insights in articles meant to inspire mathematicians coming from all sorts of different backgrounds.

Titles in this series are co-published with the Centre de Recherches Mathématiques.

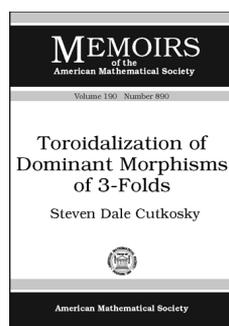
Contents: **A. Granville**, An introduction to additive combinatorics; **J. Solymosi**, Elementary additive combinatorics; **A. Balog**, Many additive quadruples; **E. Szemerédi**, An old new proof of Roth’s

theorem; **P. Kurlberg**, Bounds on exponential sums over small multiplicative subgroups; **B. Green**, Montréal notes on quadratic Fourier analysis; **B. Kra**, Ergodic methods in additive combinatorics; **T. Tao**, The ergodic and combinatorial approaches to Szemerédi’s theorem; **I. Z. Ruzsa**, Cardinality questions about sumsets; **E. S. Croot III** and **V. F. Lev**, Open problems in additive combinatorics; **M.-C. Chang**, Some problems related to sum-product theorems; **J. Cilleruelo** and **A. Granville**, Lattice points on circles, squares in arithmetic progressions and sumsets of squares; **M. B. Nathanson**, Problems in additive number theory. I; **K. Gyarmati**, **S. Konyagin**, and **I. Z. Ruzsa**, Double and triple sums modulo a prime; **A. A. Glibichuk** and **S. V. Konyagin**, Additive properties of product sets in fields of prime order; **G. Martin** and **K. O’Byrant**, Many sets have more sums than differences; **G. Bhowmik** and **J.-C. Schlage-Puchta**, Davenport’s constant for groups of the form $\mathbb{Z}_3 \oplus \mathbb{Z}_3 \oplus \mathbb{Z}_{3d}$; **S. D. Adhikari**, **R. Balasubramanian**, and **P. Rath**, Some combinatorial group invariants and their generalizations with weights.

CRM Proceedings & Lecture Notes, Volume 43

October 2007, 335 pages, Softcover, ISBN: 978-0-8218-4351-2, LC 2007060834, 2000 *Mathematics Subject Classification*: 11-02; 05-02, 42-02, 11P70, 28D05, 37A45, **AMS members US\$79**, List US\$99, Order code CRMP/43

Geometry and Topology



Toroidalization of Dominant Morphisms of 3-Folds

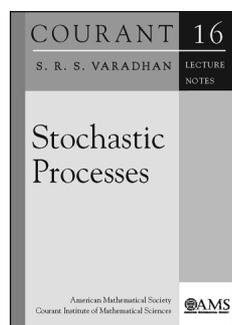
Steven Dale Cutkosky, *University of Missouri, Columbia, MO*

Contents: Introduction; An outline of the proof; Notation; Toroidal morphisms and prepared morphisms; Toroidal ideals; Toroidalization of morphisms from 3-folds to surfaces; Preparation above 2 and 3-points; Preparation; The τ invariant; Super parameters; Good and perfect points; Relations; Well prepared morphisms; Construction of τ -well prepared diagrams; Construction of a τ -very well prepared morphism; Toroidalization; Proofs of the main results; List of technical terms; Bibliography.

Memoirs of the American Mathematical Society, Volume 190, Number 890

October 2007, 222 pages, Softcover, ISBN: 978-0-8218-3998-0, LC 2007060777, 2000 *Mathematics Subject Classification*: 14E05, 14J30; 14B25, 14B05, **Individual member US\$46**, List US\$76, Institutional member US\$61, Order code MEMO/190/890

Probability



Stochastic Processes

S. R. S. Varadhan, *Courant Institute of Mathematical Sciences, New York, NY*

This is a brief introduction to stochastic processes studying certain elementary continuous-time processes. After a description of the Poisson process and related processes with independent increments as well as a brief look at

Markov processes with a finite number of jumps, the author proceeds to introduce Brownian motion and to develop stochastic integrals and Itô's theory in the context of one-dimensional diffusion processes. The book ends with a brief survey of the general theory of Markov processes.

The book is based on courses given by the author at the Courant Institute and can be used as a sequel to the author's successful book *Probability Theory* in this series.

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

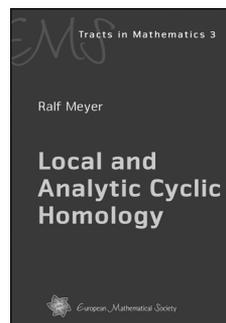
Contents: Introduction; Processes with independent increments; Poisson point processes; Jump Markov processes; Brownian motion; One-dimensional diffusions; General theory of Markov processes; Appendix A. Measures on Polish spaces; Appendix B. Additional remarks; Bibliography; Index.

Courant Lecture Notes, Volume 16

November 2007, 126 pages, Softcover, ISBN: 978-0-8218-4085-6, 2000 *Mathematics Subject Classification*: 60G05, 60G07, **AMS members** US\$23, List US\$29, Order code CLN/16

New AMS-Distributed Publications

Algebra and Algebraic Geometry



Local and Analytic Cyclic Homology

Ralf Meyer, *University of Göttingen, Germany*

Periodic cyclic homology is a homology theory for non-commutative algebras that plays a similar role in non-commutative geometry as de Rham cohomology for smooth manifolds. While it produces good results for algebras of smooth or polynomial functions, it fails for bigger algebras such as most Banach algebras or C^* -algebras. Analytic and local cyclic homology are variants of periodic cyclic homology that work better for such algebras. In this book, the author develops and compares these theories, emphasizing their homological properties. This includes the excision theorem, invariance under passage to certain dense subalgebras, a Universal Coefficient Theorem that relates them to K -theory, and the Chern-Connes character for K -theory and K -homology.

The cyclic homology theories studied in this text require a good deal of functional analysis in bornological vector spaces, which is supplied in the first chapters. The focal points here are the relationship with inductive systems and the functional calculus in non-commutative bornological algebras.

Some chapters are more elementary and independent of the rest of the book and will be of interest to researchers and students working on functional analysis and its applications.

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

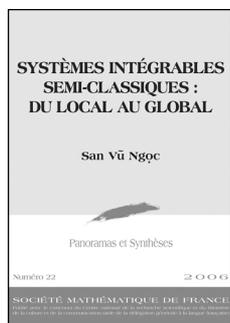
A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.

Contents: Bornological vector spaces and inductive systems; Relations between entire, analytic, and local cyclic homology; The spectral radius of bounded subsets and its applications; Periodic cyclic homology via pro-nilpotent extensions; Analytic cyclic homology and analytically nilpotent extensions; Local homotopy invariance and isoradial subalgebras; The Chern-Connes character; Appendix. Background material; Bibliography; Notation and symbols; Index.

EMS Tracts in Mathematics

July 2007, 368 pages, Hardcover, ISBN: 978-3-03719-039-5, 2000 *Mathematics Subject Classification*: 19-02, 46-02, 46L80, 46A17, 46H30, 19D55, 19K35, **AMS members** US\$62, List US\$78, Order code EMSTM/3

Differential Equations



Systèmes Intégrables Semi-Classiques: du Local au Global

San Vũ Ngọc, *Université de Grenoble I, St. Martin d'Herès, France*

This book presents a panorama of finite dimensional completely integrable Hamiltonian systems, in which classical

aspects and quantum aspects will be living side by side, with similar appearances.

Classical mechanics is considered from the viewpoint of the geometric study of the singular Lagrangian foliation, whose regular leaves are the famous Liouville tori. Singularities are tackled using local and semi-global normal forms, which involve topological and symplectic invariants. Some relationships with toric varieties are explored.

Quantum integrable systems are treated in the framework of semiclassical microlocal analysis. Pseudo-differential calculus and Fourier integral operators offer efficient tools for discovering how the geometric features of these systems influence their spectral properties.

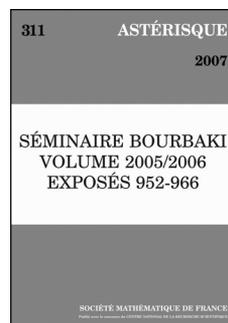
A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: Introduction; Introduction à l'analyse semi-classique; Exemples fondamentaux de systèmes intégrables; Théorie locale; Théorie semi-globale; Théorie globale; Bibliographie; Liste des figures; Index.

Panoramas et Synthèses, Number 22

June 2007, 156 pages, Softcover, ISBN: 978-2-85629-221-1, 2000 *Mathematics Subject Classification:* 37J35, 70H06, 58K45, 58J40, 53Dxx, 81Q10, 34C20, 81S10, **Individual member US\$47**, List US\$52, Order code PASY/22

Number Theory



Séminaire Bourbaki

Volume 2005/2006
Exposés 952-966

As in the preceding volumes of this seminar, one finds here fifteen survey lectures on topics of current interest: two lectures on algebraic geometry, three on partial differential equations, one on Arakelov geometry, one on p -adic analytic geometry, one on Galois representations, one on number theory, one on p -divisible groups, one on graph theory, one on operator algebras, one on representation theory, one on singular integral operators, and one on dynamical systems.

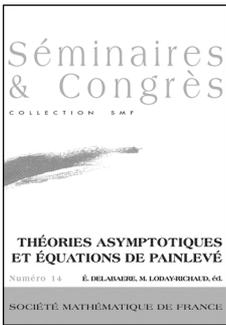
This item will also be of interest to those working in differential equations.

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Contents: *Novembre 2005:* **M. Brion**, Compactification de l'espace des modules des variétés abéliennes principalement polarisées; **N. Burq**, Explosion pour l'équation de Schrödinger au régime du "log log"; **D. Huybrechts**, Projectivity of Kähler manifolds - Kodaira's problem; **C. Soulé**, Genres de Todd et valeurs aux entiers des dérivées de fonctions L ; **J.-P. Wintenberger**, La conjecture de modularité de Serre : le cas de conducteur 1; *Mars 2006:* **G. Cornuéjols**, Le théorème fort des graphes parfaits; **A. Ducros**, Espaces analytiques p -adiques au sens de Berkovich; **E. Kowalski**, Écart entre nombres premiers successifs; **N. Lerner**, The verification of the Nirenberg-Treves conjecture; **S. Vaes**, Rigidity results for Bernoulli actions and their von Neumann algebras; *Juin 2006:* **M. Christ**, Modulation invariant and multilinear singular integral operators; **C. Gruson**, Sur les représentations de dimension finie de la super algèbre de Lie $\mathfrak{gl}(m, n)$; **W. Messing**, Travaux de Zink; **I. Rodnianski**, The wave map problem. Small data critical regularity; **J.-C. Yoccoz**, Ensembles de Julia de mesure positive et disques de Siegel des polynômes quadratiques.

Astérisque, Number 311

June 2007, 401 pages, Softcover, ISBN: 978-2-85629-230-3, 2000 *Mathematics Subject Classification:* 11H55, 14D22, 14H10, 14H40, 14K10, 14M25, 35B30, 35B35, 35B65, 32J27, 14F35, 32J25, 14K22, 14G40, 11F11, 11F80, 05C17, 14G22, 14G20, 11N05, 11N13, 11N35, 11N36, 11P32, 35S05, 47G30, 46L35, 37A20, 46L10, 32B20, 42A20, 42B25, 17B10, 14M15, 20G05, 14F30, 14L05, 35L05, 35Q99, 37F50, **Individual member US\$114**, List US\$127, Order code AST/311



Théories Asymptotiques et Équations de Painlevé

Éric Delabaere and Michèle Loday-Richaud, *Université d'Angers, France*, Editors

The major part of this volume is devoted to the study of the sixth Painlevé equation through a variety of approaches, namely elliptic representation, the classification of algebraic solutions and so-called “dessins d'enfants” deformations, affine Weyl group symmetries and dynamics using the techniques of Riemann–Hilbert theory and those of algebraic geometry.

Discrete Painlevé equations and higher order equations, including the mKdV hierarchy and its Lax pair and a WKB analysis of perturbed Noumi–Yamada systems, are given a place of study, as well as theoretical settings in Galois theory for linear and non-linear differential equations, difference and q -difference equations with applications to Painlevé equations and to integrability or non-integrability of certain Hamiltonian systems.

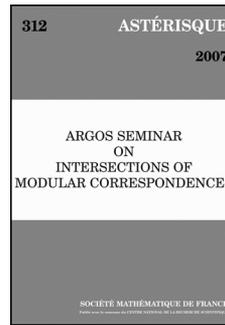
This item will also be of interest to those working in algebra and algebraic geometry.

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: P. Boalch, Six results on Painlevé VI; P. A. Clarkson, Special polynomials associated with rational and algebraic solutions of the Painlevé equations; P. A. Clarkson, N. Joshi, and M. Mazzocco, The Lax pair for the mKdV hierarchy; R. Conte, M. Musette, and C. Verhoeven, Painlevé property of the Hénon–Heiles Hamiltonians; D. Guzzetti, The elliptic representation of the sixth Painlevé equation; M. Inaba, K. Iwasaki, and M.-H. Saito, Dynamics of the sixth Painlevé equation; K. Kajiwara, T. Masuda, M. Noumi, Y. Ohta, and Y. Yamada, Point configurations, Cremona transformations and the elliptic difference Painlevé equation; A. V. Kitaev, Remarks toward a classification of $RS_4^2(3)$ -transformations and algebraic solutions of the sixth Painlevé equation; J. Morales-Ruiz, A remark about the Painlevé transcendents; A. Ramani, B. Grammaticos, and T. Tamizhmani, On the alternate discrete Painlevé equations and related systems; J. Sauloy, Isomonodromy for complex linear q -difference equations; Y. Takei, On a local reduction of a higher order Painlevé equation and its underlying Lax pair near a simple turning point of the first kind; H. Umemura, Galois theory and Painlevé equations; C. Zhang, Solutions asymptotiques et méromorphes d'équations aux q -différences; Programme; Liste des participants.

Séminaires et Congrès, Number 14

July 2007, 363 pages, Softcover, ISBN: 978-2-85629-229-7, 2000 *Mathematics Subject Classification*: 12H05, 12H10, 13B05, 14D20, 17B65, 30E05, 30E99, 33D10, 33E17, 34M15, 34M55, 34M60, 37J30, 39A10, 39A13, 39A20, 39B22, 40G10, 58H05; 14E07, 14H52, 14N20, 32G34, 32S40, 33E17, 34E20, 34M35, 34M40, 34M55, 37J35, **Individual member US\$99**, List US\$110, Order code SECO/14



Argos Seminar on Intersections of Modular Correspondences

Ulrich Görtz, *Universität Bonn, Germany*, and Michael Rapoport, *Universität Bonn, Germany*, Editors

This volume contains the written account of the Bonn Seminar on Arithmetic Geometry 2003/2004. It gives a coherent exposition of the theory of intersections of modular correspondences. The focus of the seminar is the formula for the intersection number of arithmetic modular correspondences due to Gross and Keating. Other topics treated are Hurwitz's theorem on the intersection of modular correspondences over the field of complex numbers and the relation of the arithmetic intersection numbers to Fourier coefficients of Siegel–Eisenstein series.

Also included is background material on one-dimensional formal groups and their endomorphisms and on quadratic forms over the ring of p -adic integers.

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Contents: G. Vogel, Modular polynomials; U. Görtz, A sum of representation numbers; U. Görtz, Arithmetic intersection numbers; T. Wedhorn, The genus of the endomorphisms of a supersingular elliptic curve; V. Meusers, Lubin–Tate formal groups; E. Viehmann and K. Ziegler, Formal moduli of formal \mathcal{O}_K -modules; S. Wewers, Canonical and quasi-canonical liftings; V. Meusers, Canonical and quasi-canonical liftings in the split case; E. Viehmann, Lifting endomorphisms of formal \mathcal{O}_K -modules; I. Vollaard, Endomorphisms of quasi-canonical lifts; I. Bouw, Invariants of ternary quadratic forms; M. Rapoport, Deformations of isogenies of formal groups; S. Wewers, An alternative approach using ideal bases; T. Wedhorn, Calculation of representation densities; M. Rapoport and T. Wedhorn, The connection to Eisenstein series; Index.

Astérisque, Number 312

June 2007, 210 pages, Softcover, ISBN: 978-2-85629-231-0, 2000 *Mathematics Subject Classification*: 11G18, 11E08, 11F03, 11F30, 11F32, 11G15, 14B12, 14G35, 14K07, 14K22, 14L05, **Individual member US\$61**, List US\$68, Order code AST/312