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Algebra and Algebraic Geometry
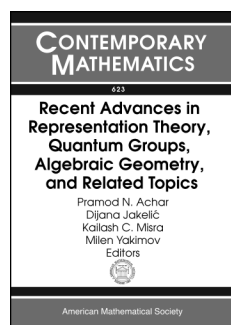
Recent Advances in Representation Theory, Quantum Groups, Algebraic Geometry, and Related Topics

Pramod N. Achar, *Louisiana State University, Baton Rouge, LA*, **Dijana Jakelić**, *University of North Carolina at Wilmington, NC*, **Kailash C. Misra**, *North Carolina University, Raleigh, NC*, and **Milen Yakimov**, *Louisiana State University, Baton Rouge, LA*, Editors

This volume contains the proceedings of two AMS Special Sessions "Geometric and Algebraic Aspects of Representation Theory" and "Quantum Groups and Noncommutative Algebraic Geometry" held October 13–14, 2012, at Tulane University, New Orleans, Louisiana.

Included in this volume are original research and some survey articles on various aspects of representations of algebras including Kac–Moody algebras, Lie superalgebras, quantum groups, toroidal algebras, Leibniz algebras and their connections with other areas of mathematics and mathematical physics.

Contents: D. Adamović, A classification of irreducible Wakimoto modules for the affine Lie algebra $A_1^{(1)}$; **A. M. Armstrong** and **K. C. Misra**, A note on $U_q(D_4^{(3)})$-Demazure crystals; **L. Carbone, W. Freyn**, and **K.-H. Lee**, Dimensions of imaginary root spaces of hyperbolic Kac–Moody algebras; **I. Demir, K. C. Misra**, and **E. Stitzinger**, On some structures of Leibniz algebras; **S. Doty** and **Y. Li**, A geometric construction of generalized q-Schur algebras; **V. Futorny, D. Grantcharov**, and **L. E. Ramirez**, On the classification of irreducible Gelfand–Tsetlin modules of $\mathfrak{sl}(3)$; **I. C.-H. Ip** and **A. M. Zeitlin**, Supersymmetry and the modular double; **D. Jakelić** and **A. Moura**, On Weyl modules for quantum and hyper loop algebras; **N. Jing** and **C. Xu**, Toroidal Lie superalgebras and free field representations; **E. Kirkman, J. Kuzmanovich**, and **J. J. Zhang**, Invariants of (−1)-skew polynomial rings under permutation

representations; **G. Liu** and **S.-H. Ng**, On total Frobenius-Schur indicators; **I. Mirković**, Loop Grassmannians in the framework of local spaces over a curve; **T. Nakashima**, Decorated geometric crystals and polyhedral realization of type D_n; **B. J. Parshall** and **L. L. Scott**, Some Koszul properties of standard and irreducible modules; **A. M. Zeitlin**, On higher order Leibniz identities in TCFT.

Contemporary Mathematics, Volume 623

October 2014, 280 pages, Softcover, ISBN: 978-0-8218-9852-9, LC 2014003372, 2010 *Mathematics Subject Classification:* 14M15, 16T05, 17A32, 17B10, 17B37, 17B67, 17B69, 20G05, 20G43, 81R50, **AMS members US$81.60**, List US$102, Order code CONM/623
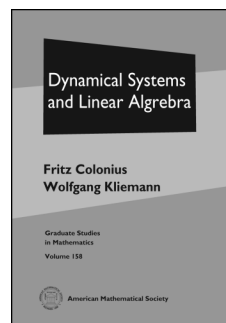
Dynamical Systems and Linear Algebra

Fritz Colonius, *Universität Augsburg, Germany*, and **Wolfgang Kliemann**, *Iowa State University, Ames, IA*

This book provides an introduction to the interplay between linear algebra and dynamical systems in continuous time and in discrete time. It first reviews the autonomous case for one matrix A via induced dynamical systems in $\mathbb{R}^d$ and on Grassmannian manifolds. Then the main nonautonomous approaches are presented for which the time dependency of $A(t)$ is given via skew-product flows using periodicity, or topological (chain recurrence) or ergodic properties (invariant measures). The authors develop generalizations of (real parts of) eigenvalues and eigenspaces as a starting point for a linear algebra for classes of time-varying linear systems, namely periodic, random, and perturbed (or controlled) systems.

The book presents for the first time in one volume a unified approach via Lyapunov exponents to detailed proofs of Floquet theory, of the properties of the Morse spectrum, and of the multiplicative ergodic theorem for products of random matrices. The main tools, chain recurrence and Morse decompositions, as well as classical ergodic theory are introduced in a way that makes the entire material accessible for beginning graduate students.

This item will also be of interest to those working in differential equations, probability and statistics, and applications.

Contents: *Matrices and linear dynamical systems:* Autonomous linear differential and difference equations; Linear dynamical systems

in $\mathbb{R}^d$; Chain transitivity for dynamical systems; Linear systems in projective space; Linear systems on Grassmannians; *Time-varying matrices and linear skew product systems:* Lyapunov exponents and linear skew product systems; Periodic linear and differential and difference equations; Morse decompositions of dynamical systems; Topological linear flows; Tools from ergodic theory; Random linear dynamical systems; Bibliography; Index.

Graduate Studies in Mathematics, Volume 158

November 2014, approximately 291 pages, Hardcover, ISBN: 978-0-8218-8319-8, LC 2014020316, 2010 *Mathematics Subject Classification:* 15-01, 34-01, 37-01, 39-01, 60-01, 93-01, **AMS members US$53.60**, List US$67, Order code GSM/158
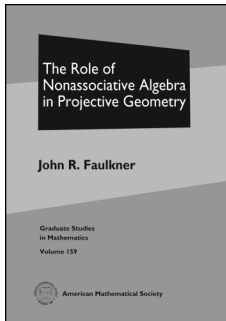
The Role of Nonassociative Algebra in Projective Geometry

John R. Faulkner, *University of Virginia, Charlottesville, VA*

There is a particular fascination when two apparently disjoint areas of mathematics turn out to have a meaningful connection to each other. The main goal of this book is to provide a largely self-contained, in-depth account of the linkage between nonassociative algebra and projective planes, with particular emphasis on octonion planes. There are several new results and many, if not most, of the proofs are new. The development should be accessible to most graduate students and should give them introductions to two areas which are often referenced but not often taught.

On the geometric side, the book introduces coordinates in projective planes and relates coordinate properties to transitivity properties of certain automorphisms and to configuration conditions. It also classifies higher-dimensional geometries and determines their automorphisms. The exceptional octonion plane is studied in detail in a geometric context that allows nondivision coordinates. An axiomatic version of that context is also provided. Finally, some connections of nonassociative algebra to other geometries, including buildings, are outlined.

On the algebraic side, basic properties of alternative algebras are derived, including the classification of alternative division rings. As tools for the study of the geometries, an axiomatic development of dimension, the basics of quadratic forms, a treatment of homogeneous maps and their polarizations, and a study of norm forms on hermitian matrices over composition algebras are included.

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

Contents: Affine and projective planes; Central automorphisms of projective planes; Coordinates for projective planes; Alternative rings; Configuration conditions; Dimension theory; Projective geometries; Automorphisms of $\mathcal{G}(V)$; Quadratic forms and orthogonal groups; Homogeneous maps; Norms and hermitian matrices; Octonion planes; Projective remoteness planes; Other geometries; Bibliography; Index.

Graduate Studies in Mathematics, Volume 159

November 2014, approximately 233 pages, Hardcover, ISBN: 978-1-4704-1849-6, LC 2014021979, 2010 *Mathematics Subject*

Classification: 51A05, 51A20, 51A25, 51A35, 51C05, 17D05, 17C50, **AMS members US$53.60**, List US$67, Order code GSM/159
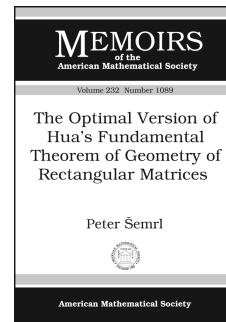
The Optimal Version of Hua's Fundamental Theorem of Geometry of Rectangular Matrices

Peter Šemrl, *University of Ljubljana, Slovenia*

Contents: Introduction; Notation and basic definitions; Examples; Statement of main results; Proofs; Bibliography.

Memoirs of the American Mathematical Society, Volume 232, Number 1089

October 2014, 74 pages, Softcover, ISBN: 978-0-8218-9845-1, LC 2014024653, 2010 *Mathematics Subject Classification:* 15A03, 51A50, **Individual member US$39**, List US$65, Institutional member US$52, Order code MEMO/232/1089

Analysis
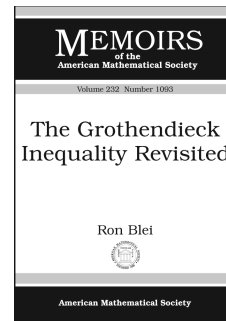
The Grothendieck Inequality Revisited

**Ron Blei**, *University of Connecticut, Storrs, Connecticut*

Contents: Introduction; Integral representations: the case of discrete domains; Integral representations: the case of topological domains; Tools; Proof of Theorem 3.5; Variations on a theme; More about Φ; Integrability; A Parseval-like formula for $\langle \mathbf{x}, \mathbf{y} \rangle$, $\mathbf{x} \in l^p$, $\mathbf{y} \in l^q$; Grothendieck-like theorems in dimensions > 2?; Fractional Cartesian products and multilinear functionals on a Hilbert space; Proof of Theorem 11.11; Some loose ends; Bibliography.

Memoirs of the American Mathematical Society, Volume 232, Number 1093

October 2014, 90 pages, Softcover, ISBN: 978-0-8218-9855-0, LC 2014024660, 2010 *Mathematics Subject Classification:* 46C05, 46E30; 47A30, 42C10, **Individual member US$42.60**, List US$71, Institutional member US$56.80, Order code MEMO/232/1093

Applications
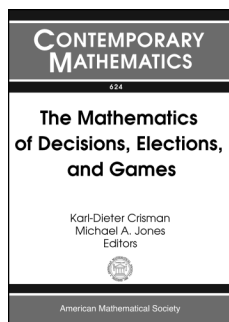
The Mathematics of Decisions, Elections, and Games

Karl-Dieter Crisman, *Gordon College, Wenham, MA*, and **Michael A. Jones**, *Mathematical Reviews, Ann Arbor, MI*, Editors

This volume contains the proceedings of two AMS Special Sessions on The Mathematics of Decisions, Elections, and Games, held January 4, 2012, in Boston, MA, and January 11–12, 2013, in San Diego, CA.

Decision theory, voting theory, and game theory are three intertwined areas of mathematics that involve making optimal decisions under different contexts. Although these areas include their own mathematical results, much of the recent research in these areas involves developing and applying new perspectives from their intersection with other branches of mathematics, such as algebra, representation theory, combinatorics, convex geometry, dynamical systems, etc.

The papers in this volume highlight and exploit the mathematical structure of decisions, elections, and games to model and to analyze problems from the social sciences.

Contents: C. Corcoran and **K. Saxe**, Redistricting and district compactness; **Z. Landau** and **F. E. Su**, Fair division and redistricting; **S. J. Brams** and **D. M. Kilgour**, When does approval voting make the "right choices"?; **K. Nehring** and **M. Pivato**, How indeterminate is sequential majority voting? A judgement aggregation perspective; **C. Stenson**, Weighted voting, threshold functions, and zonotopes; **K.-D. Crisman**, The Borda count, the Kemeny rule and the permutahedron; **M. M. Klawe, K. L. Nyman, J. N. Scott**, and **F. E. Su**, Double-interval societies; **M. Davis, M. E. Orrison**, and **F. E. Su**, Voting for committees in agreeable societies; **T. C. Ratliff**, Selecting diverse committees with candidates from multiple categories; **B. Hopkins,** Expanding the Robinson-Goforth system for $2x2$ games; **D. T. Jessie** and **D. G. Saari**, Cooperation in n-player repeated games; **M. A. Jones** and **J. M. Wilson**, The dynamics of consistent bankruptcy rules.

Contemporary Mathematics, Volume 624

October 2014, 229 pages, Softcover, ISBN: 978-0-8218-9866-6, LC 2014003691, 2010 *Mathematics Subject Classification:* 91-06, 91A05, 91A12, 91A20, 91B06, 91B08, 91B12, 91B14, 91B32, 91F10, **AMS members US$72.80**, List US$91, Order code CONM/624
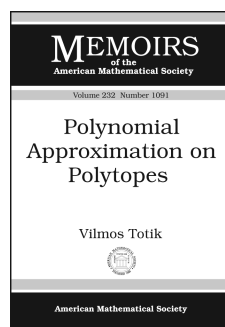
Polynomial Approximation on Polytopes

Vilmos Totik, *Bolyai Institute, University of Szeged, Hungary*
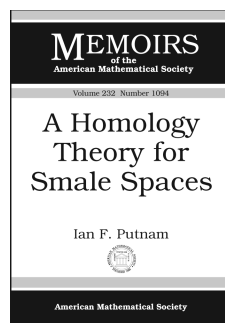
This item will also be of interest to those working in discrete mathematics and combinatorics.

Contents: *Part 1. The continuous case:* The result; Outline of the proof; Fast decreasing polynomials; Approximation on simple polytopes; Polynomial approximants on rhombi; Pyramids and local moduli on them; Local approximation on the sets K_a; Global approximation of $F = F_n$ on $S_{1/32}$ excluding a neighborhood of the apex; Global approximation of f on $S_{1/64}$; Completion of the proof of Theorem 1.1; Approximation in $\mathbf{R}^d$; A K-functional and the equivalence theorem; *Part 2. The L^p-case:* The L^p result; Proof of the L^p result; The dyadic decomposition; Some properties of L^p moduli of smoothness; Local L^p moduli of smoothness; Local approximation; Global L^p approximation excluding a neighborhood of the apex; Strong direct and converse inequalities; The K-functional in L^p and the equivalence theorem; Bibliography.

Memoirs of the American Mathematical Society, Volume 232, Number 1091

October 2014, 110 pages, Softcover, ISBN: 978-1-4704-1666-9, LC 2014024664, 2010 *Mathematics Subject Classification:* 41A10, 41A17, **Individual member US$45**, List US$75, Institutional member US$60, Order code MEMO/232/1091

Differential Equations

A Homology Theory for Smale Spaces

Ian F. Putnam, *University of Victoria, British Columbia, Canada*

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

Contents: Summary; Dynamics; Dimension groups; The complexes of an s/u-bijective factor map; The double complexes of an s/u-bijective pair; A Lefschetz formula; Examples; Questions; Bibliography.

Memoirs of the American Mathematical Society, Volume 232, Number 1094

October 2014, 122 pages, Softcover, ISBN: 978-1-4704-0909-8, LC 2014024652, 2010 *Mathematics Subject Classification:* 37D20, 37D45, **Individual member US$45.60**, List US$76, Institutional member US$60.80, Order code MEMO/232/1094

General Interest
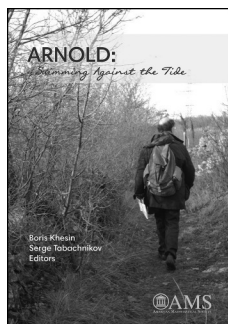
ARNOLD

Swimming Against the Tide

Boris A. Khesin, *University of Toronto, Ontario, Canada*, and **Serge L. Tabachnikov**, *ICERM, Brown University, Providence, RI, and Pennsylvania State University, State College, PA*, Editors

Vladimir Arnold, an eminent mathematician of our time, is known both for his mathematical results, which are many and prominent, and for his strong opinions, often expressed in an uncompromising and provoking manner. His dictum that "Mathematics is a part of physics where experiments are cheap" is well known.

This book consists of two parts: selected articles by and an interview with Vladimir Arnold, and a collection of articles about him written by his friends, colleagues, and students. The book is generously illustrated by a large collection of photographs, some never before published. The book presents many a facet of this extraordinary mathematician and man, from his mathematical discoveries to his daredevil outdoor adventures.

Contents: B. A. Khesin and **S. L. Tabachnikov**, Epigraph; *By Arnold:* **V. I. Arnold**, Arnold in his own words; **V. I. Arnold**, From Hilbert's superposition problem to dynamical systems; **J. Moser**, Recollections; **V. I. Arnold**, Polymathematics: Is mathematics a single science or a set of arts?; **V. I. Arnold**, A mathematical trivium; **B. A. Khesin** and **S. L. Tabachnikov**, Comments on "A Mathematical Trivium"; **V. I. Arnold**, About Vladimir Abramovich Rokhlin; *About Arnold:* **A. Givental**, To whom it may concern; **Y. Sinai**, Remembering Vladimir Arnold: Early years; **S. Smale**, Vladimir I. Arnold; **M. Berry**, Memories of Vladimir Arnold; **D. Fuchs**, Dima Arnold in my life; **Y. Ilyashenko**, V. I. Arnold, as I have seen him; **Y. Eliashberg**, My encounters with Vladimir Igorevich Arnold; **B. A. Khesin**, On V. I. Arnold and hydrodynamics; **A. Khovanskii** and **A. Varchenko**, Arnold's seminar, first years; **V. Vassiliev**, Topology in Arnold's work; **H. Hofer**, Arnold and symplectic geometry; **M. Sevryuk**, Some recollections of Vladimir Igorevich; **L. Polterovich**, Remembering V. I. Arnold; **A. Vershik**, Several thoughts about Arnold; **S. Yakovenko**, Vladimir Igorevich Arnold: A view from the rear bench.

November 2014, 173 pages, Softcover, ISBN: 978-1-4704-1699-7, LC 2014021165, 2010 *Mathematics Subject Classification:* 01A65; 01A70, 01A75, **AMS members US\$23.20**, List US\$29, Order code MBK/86

Geometry and Topology
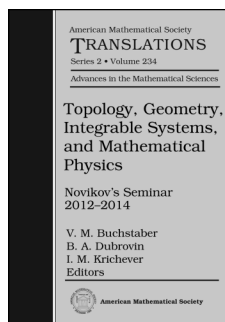
Topology, Geometry, Integrable Systems, and Mathematical Physics

Novikov's Seminar 2012–2014

V. M. Buchstaber, *Steklov Institute of Mathematics, Moscow, Russia*, **B. A. Dubrovin**, *SISSA, Trieste, Italy*, and **I. M. Krichever**, *Columbia University, New York, NY*, Editors

Articles in this collection are devoted to modern problems of topology, geometry, mathematical physics, and integrable systems, and they are based on talks given at the famous Novikov's seminar at the Steklov Institute of Mathematics in Moscow in 2012–2014. The articles cover many aspects of seemingly unrelated areas of modern mathematics and mathematical physics; they reflect the main scientific interests of the organizer of the seminar, Sergey Petrovich Novikov. The volume is suitable for graduate students and researchers interested in the corresponding areas of mathematics and physics.

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

Contents: A. V. Alexeevski and **S. M. Natanzon**, Algebras of conjugacy classes of partial elements; **I. Beloshapka** and **A. Sergeev**, Harmonic spheres in the Hilbert–Schmidt Grassmannian; **F. Bogomolov** and **C. Böhning**, On uniformly rational varieties; **M. Boiti**, **F. Pempinelli**, and **A. K. Pogrebkov**, IST of KPII equation for perturbed multisoliton solutions; **V. Buchstaber** and **J. Grbić**, Hopf algebras and homology of loop suspension spaces; **L. O. Chekhov** and **M. Mazzocco**, Quantum ordering for quantum geodesic functions of orbifold Riemann surfaces; **V. Dragović**, Pencils of conics and biquadratics, and integrability; **B. Dubrovin**, Gromov–Witten invariants and integrable hierarchies of topological type; **I. Dynnikov** and **A. Skripchenko**, On typical leaves of a measured foliated 2-complex of thin type; **A. A. Gaifullin**, Volume of a simplex as a multivalued algebraic function of the areas of its two-faces; **G. M. Kemp** and **A. P. Veselov**, Discrete analogues of Dirac's magnetic monopole and binary polyhedral groups; **H. M. Khudaverdian** and **Th. Th. Voronov**, Geometric constructions on the algebra of densities; **I. Krichever**, Amoebas, Ronkin function and Monge-Ampère measures of algebraic curves with marked points; **A. Ya. Maltsev**, The averaging of multi-dimensional Poisson brackets for systems having pseudo-phases; **A. E. Mironov**, Periodic and rapid decay rank two self-adjoint commuting differential operators; **O. I. Mokhov**, Commuting ordinary differential operators of arbitrary genus and arbitrary rank with polynomial coefficients; **M. V. Pavlov** and **S. P. Tsarev**, Classical mechanical systems with one-and-a-half degrees of freedom and Vlasov kinetic equation; **O. K. Sheinman**, Lax operator algebras of type G_2.

American Mathematical Society Translations—Series 2 (*Advances in the Mathematical Sciences*), Volume 234

November 2014, approximately 389 pages, Hardcover, ISBN: 978-1-4704-1871-7, 2010 *Mathematics Subject Classification:* 00B25, 51P05, 53-XX, 14-XX, 55-XX, 70-XX, 76-XX, 81-XX, 39-XX, 17B65,

17B80, 14H70, 37J35, 37K15, 70H06, 70H08, **AMS members US$159.20,** List US$199, Order code TRANS2/234
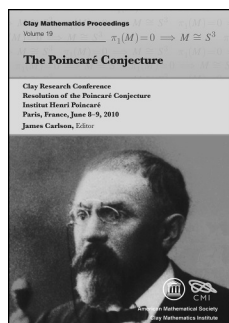
The Poincaré Conjecture

**James Carlson**, *Clay Mathematics Institute, Cambridge, MA*, Editor

The conference to celebrate the resolution of the Poincaré conjecture, which is one of the Clay Mathematics Institute's seven *Millennium Prize Problems*, was held at the Institut Henri Poincaré in Paris. Several leading mathematicians gave lectures providing an overview of the conjecture—its history, its influence on the development of mathematics, and, finally, its proof.

This volume contains papers based on the lectures at that conference. Taken together, they form an extraordinary record of the work that went into the solution of one of the great problems of mathematics.

Titles in this series are co-published with the Clay Mathematics Institute (Cambridge, MA).

Contents: M. Atiyah, Geometry in 2, 3 and 4 dimensions; **J. Morgan**, 100 Years of Topology: Work Stimulated by Poincaré's Approach to Classifying Manifolds; **C. T. McMullen**, The Evolution of Geometric Structures on 3-Manifolds; **S. K. Donaldson**, Invariants of Manifolds and the Classification Problem; **D. Gabai**, **R. Meyerhoff**, and **P. Milley**, Volumes of Hyperbolic 3-Manifolds; **M. Gromov**, Manifolds: Where do we come from? What are we? Where are we going?; **G. Tian**, Geometric Analysis on 4-Manifolds.

Clay Mathematics Proceedings, Volume 19

November 2014, approximately 181 pages, Softcover, ISBN: 978-0-8218-9865-9, 2010 *Mathematics Subject Classification:* 53-02, 53C44, 53C99, 53D45, 57-02, 57M40, **AMS members US$55.20,** List US$69, Order code CMIP/19
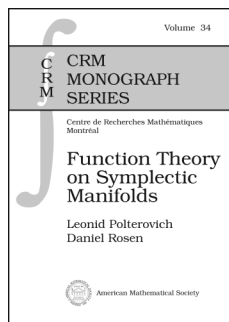
Function Theory on Symplectic Manifolds

Leonid Polterovich and **Daniel Rosen**, *Tel Aviv University, Israel*

This is a book on symplectic topology, a rapidly developing field of mathematics which originated as a geometric tool for problems of classical mechanics. Since the 1980s, powerful methods such as Gromov's pseudo-holomorphic curves and Morse-Floer theory on loop spaces gave rise to the discovery of unexpected symplectic phenomena. The present book focuses on function spaces associated with a symplectic manifold. A number of recent advances show that these spaces exhibit intriguing properties and structures, giving rise to an alternative intuition and new tools in symplectic topology. The book provides an essentially self-contained introduction into these developments along with applications to symplectic topology, algebra and geometry of symplectomorphism groups, Hamiltonian dynamics and quantum mechanics. It will appeal to researchers and students from the graduate level onwards.

I like the spirit of this book. It formulates concepts clearly and explains the relationship between them. The subject matter is important and interesting.

—*Dusa McDuff, Barnard College, Columbia University*

This is a very important book, coming at the right moment. The book is a remarkable mix of introductory chapters and research topics at the very forefront of actual research. It is full of cross fertilizations of different theories, and will be useful to Ph.D. students and researchers in symplectic geometry as well as to many researchers in other fields (geometric group theory, functional analysis, mathematical quantum mechanics). It is also perfectly suited for a Ph.D.-students seminar.

—*Felix Schlenk, Université de Neuchâtel*

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

Contents: Three wonders of symplectic geometry; C^0-rigidity of the Poisson bracket; Quasi-morphisms; Subadditive spectral invariants; Symplectic quasi-states and quasi-measures; Applications of partial symplectic quasi-states; A Poisson bracket invariant of quadruples; Symplectic approximation theory; Geometry of covers and quantum noise; Preliminaries from Morse theory; An overview of Floer theory; Constructing subadditive spectral invariants; Bibliography; Nomenclature; Subject index; Name index.

CRM Monograph Series, Volume 34

October 2014, 203 pages, Hardcover, ISBN: 978-1-4704-1693-5, LC 2014020767, 2010 *Mathematics Subject Classification:* 53Dxx; 57R17, 81S10, 81P15, 22E65, 20F99, 28A10, **AMS members US$72**, List US$90, Order code CRMM/34

Number Theory
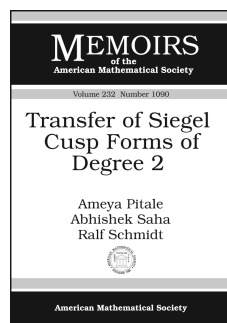
Transfer of Siegel Cusp Forms of Degree 2

Ameya Pitale, *University of Oklahoma, Norman, Oklahoma*, **Abhishek Saha**, *University of Bristol, United Kingdom*, and **Ralf Schmidt**, *University of Oklahoma, Norman, Oklahoma*

Contents: Introduction; Notation; Distinguished vectors in local representations; Global L-functions for $GSp_4 \times GL_2$; The pullback formula; Holomorphy of global L-functions for $GSp_4 \times GL_2$; Applications; Bibliography.

Memoirs of the American Mathematical Society, Volume 232, Number 1090

October 2014, 107 pages, Softcover, ISBN: 978-0-8218-9856-7, LC 2014024655, 2010 *Mathematics Subject Classification:* 11F70, 11F46, 11F67, **Individual member US$45**, List US$75, Institutional member US$60, Order code MEMO/232/1090

Probability and Statistics
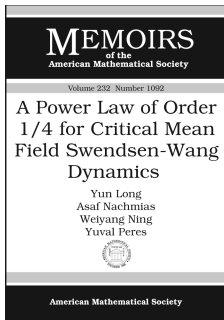
A Power Law of Order 1/4 for Critical Mean Field Swendsen-Wang Dynamics

Yun Long, *University of California, Berkeley, California*, **Asaf Nachmias**, *University of British Columbia, Vancouver, British Columbia, Canada*, **Weiyang Ning**, *University of Washington, Seattle, Washington*, and **Yuval Peres**, *Microsoft Research, Redmond, Washington*

Contents: Introduction; Statement of the results; Mixing time preliminaries; Outline of the proof of Theorem 2.1; Random graph estimates; Supercritical case; Subcritical case; Critical Case; Fast mixing of the Swendsen-Wang process on trees; Acknowledgements; Bibliography.

Memoirs of the American Mathematical Society, Volume 232, Number 1092

October 2014, 84 pages, Softcover, ISBN: 978-1-4704-0910-4, LC 2014024667, 2010 *Mathematics Subject Classification:* 60J10; 82B20, **Individual member US$39**, List US$65, Institutional member US$52, Order code MEMO/232/1092

New AMS-Distributed Publications

Analysis
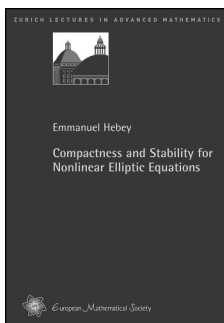
Compactness and Stability for Nonlinear Elliptic Equations

Emmanuel Hebey, *Université de Cergy-Pontoise, France*

The book offers an expanded version of lectures given at ETH Zürich in the framework of a Nachdiplomvorlesung. Compactness and stability for nonlinear elliptic equations in the inhomogeneous context of closed Riemannian manifolds are investigated. This field is presently undergoing great development.

The author describes blow-up phenomena and presents the progress made over the past years on the subject, giving an up-to-date description of the new ideas, concepts, methods, and theories in the field. Special attention is devoted to the nonlinear stationary Schrödinger equation and to its critical formalation.

Intended to be as self-contained as possible, the book is accessible to a broad audience of readers, including graduate students and researchers.

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

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

Contents: Some model equations; Basic variational methods; The L^p and H^1-theories for blow-up; Blowing-up solutions in the critical case; An introduction to elliptic stability; Bounded stability; The C^0-theory for blow-up; Analytic stability; Bibliography.

Zurich Lectures in Advanced Mathematics, Volume 20

January 2014, 301 pages, Softcover, ISBN: 978-3-03719-134-7, 2010 *Mathematics Subject Classification:* 58J05, 35J15, **AMS members US$41.60**, List US$52, Order code EMSZLEC/20
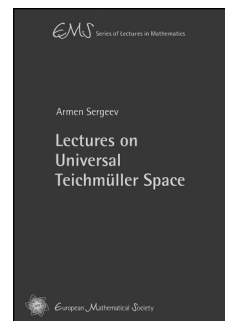
Lectures on Universal Teichmüller Space

Armen N. Sergeev, *Steklov Mathematical Institute, Moscow, Russia*

This book is based on a lecture course given by the author at the Educational Center of the Steklov Mathematical Institute in 2011. It is designed for a one-semester course for undergraduate students familiar with basic differential geometry and complex and functional analysis.

The universal Teichmüller space $\mathcal{T}$ is the quotient of the space of quasisymmetric homeomorphisms of the unit circle modulo Möbius transformations. The first part of the book is devoted to the study of geometric and analytic properties of $\mathcal{T}$. It is an infinite-dimensional Kähler manifold which contains all classical Teichmüller spaces of compact Riemann surfaces as complex submanifolds, which explains the name "universal Teichmüller space". Apart from classical Teichmüller spaces, $\mathcal{T}$ contains the space S of diffeomorphisms of the circle modulo Möbius transformations. The latter space plays an important role in the quantization of the theory of smooth strings.

The quantization of $\mathcal{T}$ is presented in the second part of the book. In contrast with the case of diffeomorphism space S, which can be quantized in frames of the conventional Dirac scheme, the quantization of $\mathcal{T}$ requires an absolutely different approach based on the noncommutative geometry methods.

The book concludes with a list of 24 problems and exercises which can used to prepare for examinations.

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

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Contents: Quasiconformal maps; Universal Teichmüller space; Subspaces of universal Teichmüller space; Grassmann realization of the universal Teichmüller space; Quantization of space of diffeomorphisms; Quantization of Teichmüller space; Instead of an

About the cover
The joy of Texas

This month's cover reminds us that the 2015 Joint Mathematics Meetings will take place in San Antonio, Texas, January 10–13, 2015.

Entering "Mexican restaurants, San Antonio" into Google brings up nearly half a million hits—and chile peppers are a central ingredient in Mexican food. On the cover, clockwise from the upper left, are these peppers: chile de árbol, guajillo, serrano, habanero, puya, pequin.

—Bill Casselman
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General Interest
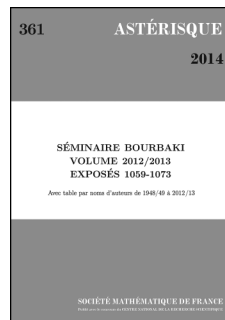
Séminaire Bourbaki: Volume 2012/2013 Exposés 1059–1073

A note to readers: This book is in French.

This 65th volume of the Bourbaki Seminar contains the texts of the fifteen survey lectures presented during 2012/2013 on the following topics: Hodge theory; the structure of certain homeomorphism groups of a Cantor space; differential equations in metric spaces; stochastic partial differential equations; probability theory; laminations and 3-dimensional manifolds; finite groups; the representations of classical groups and on the categorification of those of Lie algebras; the Bloch-Kato conjecture in Galois cohomology; algebraic geometry; ergodic theory; the hyperbolicity of hypersurfaces in projective spaces; the Baum-Connes conjecture.

For the table of contents, go to http://www.ams.org/bookstore.

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