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Algebra and Algebraic Geometry

Monoidal Categories and the Gerstenhaber Bracket in Hochschild Cohomology

Reiner Hermann, Norwegian University of Science and Technology, Trondheim, Norway

Contents: Introduction; Prerequisites; Extension categories; The Retakh isomorphism; Hochschild cohomology; A bracket for monoidal categories; Application I: The kernel of the Gerstenhaber bracket; Application II: The Ext-algebra of the identity functor; Appendix A: Basics; Bibliography.

Memoirs of the American Mathematical Society, Volume 243, Number 1151

Descent Construction for GSpin Groups

Joseph Hundley, State University of New York at Buffalo, New York, and Eitan Sayag, Hebrew University of Jerusalem, Israel

Contents: Introduction; Part 1. General matters: Some notions related to Langlands functoriality; Notation; The Spin groups GSpin_n and their quasisplit forms; Unipotent periods; Part 2. Odd case: Notation and statement; Unramified correspondence; Eisenstein series; Descent construction; Appendix III: Preparations for the proof of Theorem 15.0.12; Appendix IV: Proof of Theorem 15.0.12; Appendix V: Auxiliary results used to prove Theorem 15.0.12; Appendix VI: Local results on Jacquet functors; Appendix VII: Identities of unipotent periods; Bibliography.

Memoirs of the American Mathematical Society, Volume 243, Number 1148

Real Non-Abelian Mixed Hodge Structures for Quasi-Projective Varieties: Formality and Splitting

J. P. Pridham, University of Edinburgh, United Kingdom

Contents: Introduction; Splittings for MHS on real homotopy types; Non-abelian structures; Structures on cohomology; Relative Malcev homotopy types; Structures on relative Malcev homotopy types; MHS on relative Malcev homotopy types of compact Kähler manifolds; MHS on relative Malcev homotopy types of compact Kähler manifolds; Variations of mixed Hodge and mixed twistor structures; Monodromy at the Archimedean place; Simplicial and singular varieties; Algebraic MHS/MTS for quasi-projective varieties I; Algebraic MHS/MTS for quasi-projective varieties II—non-trivial monodromy; Canonical splittings; SL_2 splittings of non-abelian MTS/MHS and strictification; Bibliography.

Memoirs of the American Mathematical Society, Volume 243, Number 1150

838 Notices of the AMS Volume 63, Number 7
Differential Equations

Layer Potentials and Boundary-Value Problems for Second Order Elliptic Operators with Data in Besov Spaces

Ariel Barton, University of Arkansas, Fayetteville, and Svitlana Mayboroda, University of Minnesota, Minneapolis

Contents: Introduction; Definitions; The Main theorems; Interpolation, function spaces and elliptic equations; Boundeness of integral operators; Trace theorems; Results for Lebesgue and Sobolev spaces: Historic account and some extensions; The Green’s formula representation for a solution; Invertibility of layer potentials and well-posedness of boundary-value problems; Besov spaces and weighted Sobolev spaces; Bibliography.

Memoirs of the American Mathematical Society, Volume 243, Number 1149

Mathematics Subject Classification: 35J25; 31B20, 35C15, 46E35,
Individual member US$49.80, List US$83, Institutional member US$66.40, Order code MEMO/243/1149

Recent Advances in Partial Differential Equations and Applications

Vicenţiu D. Rădulescu, King Abdulaziz University, Jeddah, Saudi Arabia, Adélia Sequeira, Universidade de Lisboa, Portugal, and Vsevolod A. Solomnikov, Steklov Mathematical Institute, St. Petersburg, Russia, Editors

This volume contains the proceedings of the International Conference on Recent Advances in PDEs and Applications, in honor of Hugo Beirão da Veiga’s 70th birthday, held from February 17–21, 2014, in Levico Terme, Italy.

The conference brought together leading experts and researchers in nonlinear partial differential equations to promote research and to stimulate interactions among the participants. The workshop program testified to the wide-ranging influence of Hugo Beirão da Veiga on the field of partial differential equations, in particular those related to fluid dynamics.

In his own work, da Veiga has been a seminal influence in many important areas: Navier-Stokes equations, Stokes systems, non-Newtonian fluids, Euler equations, regularity of solutions, perturbation theory, vorticity phenomena, and nonlinear potential theory, as well as various degenerate or singular models in mathematical physics. This same breadth is reflected in the mathematical papers included in this volume.

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

Contents: A. Sequeira, J.-P. Dias, A. Valli, P. Secchi, L. Berselli, and F. Crispo, Tributes to Hugo Beirão da Veiga; H. A. Baba, C. Amrouche, and M. Escobedo, Analyticity of the semi-group generated by the Stokes operator with Navier-type boundary conditions on $L^p$-spaces; P. Antonelli and P. Marcati, Some results on systems for quantum fluids; C. Bardos and T. T. Nguyen, Remarks on the Darcy limit for the compressible flows; V. Barcucci and L. L. Baglini, A generalization of Gauss’ divergence theorem; L. C. Berselli and S. Spirito, Weak solutions to the Navier-Stokes equations constructed by semi-discretization are suitable; D. Breit, Existence theory for generalized Newtonian fluids; G. BUTTAZZO and B. Velichkov, The spectral drop problem; D. Chae, On the vanishing theorems for the discretely self-similar solutions to the Hall equations; F. Crispo and P. Maremonti, A high regularity result of solutions to a modified $p$-Navier-Stokes system; R. Farwig, C. Simader, H. Sohr, and W. Varnhorn, General properties of the Helmholtz decomposition in spaces of $L^q$-type; E. Feireisl and Y. Sun, Conditional regularity of very weak solutions to the Navier-Stokes-Fourier system; F. Flandoli, Possible effect of noise on stretching mechanism; G. P. Galdi and C. R. Grisanti, On the plane steady-state flow of a shear-thinning liquid past an obstacle in the singular case; V. Georgiev and A. R. Glampedakis, Sectorial Hamiltonians without zero resonance in one dimension; Z. Grujčić, Vortex stretching and anisotropic diffusion in the 3D Navier-Stokes equations; P. Kaplický, On $L^q$ estimates for planar flows up to boundary; B. Doutet and S. Nečasová, Non equilibrium diffusion limit in a barotropic radiative flow; R. Rautmann, Decomposition of the homogeneous space $\mathbb{R}^d$ with respect to the Dirichlet form $(\mathbf{V}u, \mathbf{V}v)$ and applications; S. Rionero, Convection in ternary porous layers with depth-dependent permeability and viscosity; F. Miranda and J. F. Rodrigues, On a variational inequality for incompressible non-Newtonian thick flows; E. Molitor and M. Ružička, On inhomogeneous $p$-Navier–Stokes systems; Y. Shibata, On the global well-posedness of some free boundary problem for a compressible barotropic viscous fluid flow; V. A. Solonnikov, On a free boundary problem of magnetohydrodynamics for a viscous incompressible fluid not subjected to capillary forces; A. Valli and F. Vasseur, Relative entropy and contraction for extremal shocks of conservation laws up to a shift.

Contemporary Mathematics, Volume 666

Mathematics Subject Classification: 35Q06, 76-06; 35A01, 35B40, 35J60, 35K55, 35L70, 65N06, 76D05,
AMS members US$86.40, List US$108, Order code CONM/666
Richard Stanley’s work in combinatorics revolutionized and reshaped the subject. Many of his hallmark ideas and techniques imported from other areas of mathematics have become mainstays in the framework of modern combinatorics. In addition to collecting several of Stanley’s most influential papers, this volume also includes his own short reminiscences on his early years, and on his celebrated proof of the Upper Bound Theorem.

Contents: The early years; How the upper bound conjecture was proved; Theory and application of plane partitions: Part 1; Theory and application of plane partitions: Part 2; Modular elements of geometric lattices; Supersolvable lattices; Linear homogeneous diophantine equations and magic labelings of graphs; Acyclic orientations of graphs; Combinatorial reciprocity theorems; The upper bound conjecture and Cohen-Macaulay rings; Combinatorial reciprocity theorems; Binomial posets, Möbius inversion, and permutation enumeration; Eulerian partitions of a unit hypercube, voir note ci-après; Hilbert functions of graded algebras; The number of faces of a simplicial convex polytope; Differential posets; Weyl groups, the hard Lefschetz theorem, and the Sperner property; Two combinatorial applications of the differential posets; Weyl groups, the hard Lefschetz theorem, and unimodal sequences in algebra, combinatorics, and geometry; Eulerian partitions of a partially ordered sets; An introduction to combinatorial commutative algebra; On the number of reduced decompositions of elements of Coxeter groups; A baker’s dozen of conjectures concerning plane partitions; Unimodality and Lie superalgebras; Two poset polytopes; Generalized H-vectors; intersection cohomology of toric varieties, and related results; Differentiably finite power series; Log-concave and unimodal sequences in algebra, combinatorics, and geometry; Some combinatorial properties of Jack symmetric functions; Subdivisions and local H-vectors; with A. Björner and A. Garsia, An introduction to Cohen-Macaulay partially ordered sets; An introduction to combinatorial commutative algebra; On the number of reduced decompositions of elements of Coxeter groups; A baker’s dozen of conjectures concerning plane partitions; Unimodality and Lie superalgebras; Two poset polytopes; Generalized H-vectors; intersection cohomology of toric varieties, and related results; Differentiably finite power series; Log-concave and unimodal sequences in algebra, combinatorics, and geometry; Some combinatorial properties of Jack symmetric functions; Subdivisions and local H-vectors; with S. Billey and W. Jokusch, Some combinatorial properties of Schubert polynomials; with S. Fomin, Schubert polynomials and the nilCoxeter algebra; Flag f-vectors and the cd-index; A symmetric function generalization of the chromatic polynomial of a graph; Irreducible symmetric group characters of rectangular shape; Increasing and decreasing subsequences and their variants; Promotion and evacuation; A conjectured combinatorial interpretation of the normalized irreducible character values of the symmetric group.

Collected Works, Volume 25


Richard Stanley’s work in combinatorics revolutionized and reshaped the subject. His lectures, papers, and books inspired a generation of researchers. In this volume these researchers explain how Stanley’s vision and insights influenced and guided their own perspectives on the subject. As a valuable bonus, this book contains a collection of Stanley’s short comments on each of his papers.

This book may serve as an introduction to several different threads of ongoing research in combinatorics as well as giving historical perspective.

Contents: R. P. Stanley, Publications; C. A. Athanasiadis, A survey of subdivisions and local h-vectors; M. Beck, Stanley’s major contributions to Ehrhart theory; L. J. Billera, “Even more intriguing, if rather less plausible…” Face numbers of convex polytopes; S. C. Billey and P. R. W. McNamara, The contributions of Stanley to the fabric of symmetric and quasisymmetric functions; A. Björner, “Let Δ be a Cohen-Macaulay complex …”; F. Brenti, Stanley’s work on unimodality; P. Diaconis, Five stories for Richard; A. Garsia, J. Haglund, G. Xin, and M. Zabrocki, Some new applications of the Stanley-Macdonald Pieri rules; I. M. Gessel, A historical survey of P-partitions; I. P. Goulden and D. M. Jackson, Transitive factorizations of permutations and geometry; T. Hibi, Stanley’s influence on monomial ideals; M. Hochster, Cohen-Macaulay varieties, geometric complexes, and combinatorics; C. Krattenthaler, Plane partitions in the work of Richard Stanley and his school; C. Lenart, Combinatorial representation theory of Lie algebras; Richard Stanley’s work and the way it was continued; J. Propp, Lessons I learned from Richard Stanley; A. Schilling, Richard Stanley through a crystal lens and from a random angle; J. Shareshian and M. L. Wachs, From poset topology to q-Eulerian polynomials to Stanley’s chromatic symmetric functions; P. Śniady, Stanley character polynomials; S. Sundaram, Some problems arising from partition poset homology.

Probability and Statistics

Probability on Algebraic and Geometric Structures

Gregory Budzban, Southern Illinois University, Carbondale, IL, Harry Randolph Hughes, Southern Illinois University, Carbondale, IL, and Henri Schurz, Southern Illinois University, Carbondale, IL, Editors

This volume contains the proceedings of the International Research Conference “Probability on Algebraic and Geometric Structures”, held from June 5–7, 2014, at Southern Illinois University, Carbondale, IL, celebrating the careers of Philip Feinsilver, Salah-Eldin A. Mohammed, and Arunava Mukherjea.

These proceedings include survey papers and new research on a variety of topics such as probability measures and the behavior of stochastic processes on groups, semigroups, and Clifford algebras; algebraic methods for analyzing Markov chains and products of random matrices; stochastic integrals and stochastic ordinary, partial, and functional differential equations.

Contents: A. Anckar and G. Högnäs, The fine structure of the stationary distribution for a simple Markov process; D. Bell, Superdegenerate hypoelliptic differential operators; G. Budzban and A. Mukherjea, Some remarks on the convolution equation $\mu * \beta = \mu$ and product semigroups; S. Chakraborty, Limit distributions of products of i.i.d. random $2 \times 2$ stochastic matrices: An open problem; A. Cosso, C. Di Girolami, and F. Russo, Calculus via regularizations in Banach spaces and Kolmogorov-type path-dependent equations; P. Feinsilver, Matrices with zero row sums, tree theorems and Markov chain on trees; P. Graczyk and P. Sawyer, Convolution of orbital measures on symmetric spaces: A survey; G. Högnäs and B. Jung, Exit times for some autoregressive processes with non-Gaussian noise distributions; I. Kemajou-Brown, Brief history of optimal control theory and some recent developments; J. Kocik, Krawtchouk matrices, Feynman path integral and the split quaternions; R. Léandre, The Itô-Stratonovich formula for an operator of order four; C. R. E. Raja and R. Schott, Random walks on motion groups; H. Schurz and A. Talafha, Existence, uniqueness, and energy of modified stochastic sine-Gordon equation with multiplicative noise on one-dimensional domain; L. Siritiwardena and H. R. Hughes, Squared Bessel process with delay; G. S. Staples, Kravchuk matrices and induced operators on Clifford algebras.

Contemporary Mathematics, Volume 668


New AMS-Distributed Publications

Analysis

Handbook of Teichmüller Theory: Volume VI

Athanase Papadopoulos, Université de Strasbourg, France, Editor

This volume is the sixth in a series dedicated to Teichmüller theory in a broad sense, including various moduli and deformation spaces, and the study of mapping class groups.

It is divided into five parts:

- Part A: The metric and the analytic theory
- Part B: The group theory
- Part C: Representation theory and generalized structures
- Part D: The Grothendieck–Teichmüller theory
- Part E: Sources

The topics surveyed include Grothendieck’s construction of the analytic structure of Teichmüller space, identities on the geodesic length spectrum of hyperbolic surfaces (including Mirzakhani’s application to the computation of Weil-Petersson volumes), moduli spaces of configurations spaces, the Teichmüller tower with the action of the Galois group on dessins d’enfants, and several other actions related to surfaces. The last part contains three papers by Teichmüller’s famous paper Extremale quasikonforme Abbildungen und quadratische Differenzial.

The handbook is addressed to researchers and to graduate students. This item will also be of interest to those working in geometry and topology.

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IRMA Lectures in Mathematics and Theoretical Physics, Volume 27

Higher-Dimensional Generalized Manifolds: Surgery and Constructions

Alberto Cavicchioli, Università degli Studi di Modena e Reggio Emilia, Italy, Friedrich Hegenbarth, Università degli Studi di Milano, Italy, and Dušan Repovš, University of Ljubljana, Slovenia

Generalized manifolds are a most fascinating subject to study. They were introduced in the 1930s, when topologists tried to detect topological manifolds among more general spaces. (This is now called the manifold recognition problem.) As such, generalized manifolds have served to enhance our understanding of the nature of genuine manifolds. However, it soon became more important to study the category of generalized manifolds itself.

A breakthrough was made in the 1990s, when several topologists discovered a systematic way of constructing higher-dimensional generalized manifolds, based on advanced surgery techniques. In fact, the development of controlled surgery theory and the study of generalized manifolds developed in parallel. In this process, earlier studies of geometric surgery turned out to be very helpful.

Generalized manifolds will continue to be an attractive subject to study, for there remain several unsolved fundamental problems. Moreover, they hold promise for new research, e.g. for finding appropriate structures on these spaces which could bring to light geometric (or even analytic) aspects of higher-dimensional generalized manifolds.

This is the first book to systematically collect the most important material on higher-dimensional generalized manifolds and controlled surgery. It is self-contained and its extensive list of references reflects the historic development. The book is based on the authors’ graduate courses and seminars, as well as their talks given at various meetings, and is suitable for advanced graduate students and researchers in algebraic and geometric topology.

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

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EMS Series of Lectures in Mathematics, Volume 23