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Geometric Nonlinear Functional Analysis
Volume 1

Yoav Benyamini, *Technion—Israel Institute of Technology, Haifa*, and **Joram Lindenstrauss**, H*ebrew University, Jerusalem, Israel*

The book presents a systematic and unified study of geometric nonlinear functional analysis. The main theme is the study of uniformly continuous and Lipschitz functions between Banach spaces (e.g., differentiability, stability, approximation, existence of extensions, fixed points, etc.). This study leads naturally also to the classification of Banach spaces and of their important subsets (mainly spheres) in the uniform and Lipschitz categories.

Many recent rather deep theorems and delicate examples are included with complete and detailed proofs. Challenging open problems are described and explained, and promising new research directions are indicated.

Volume 48; 2000; 488 pages; Hardcover; ISBN 0-8218-0835-4; List $65; **All AMS members $52**; Order code COLL/48CT002

Global Solutions of Nonlinear Schrödinger Equations

J. Bourgain, *Institute for Advanced Study, Princeton, NJ*

This volume presents recent progress in the theory of nonlinear dispersive equations, primarily the nonlinear Schrödinger (NLS) equation. The Cauchy problem for defocusing NLS with critical nonlinearity is discussed. New techniques and results are described on global existence and properties of solutions with Large Cauchy data. Current research in harmonic analysis around Strichartz's inequalities and its relevance to nonlinear PDE is presented. Several topics in NLS theory on bounded domains are reviewed. Using the NLS as an example, the book offers comprehensive insight on current research related to dispersive equations and Hamiltonian PDEs.

Volume 46; 1999; 182 pages; Hardcover; ISBN 0-8218-1919-4; List $35; **Individual member $21**; Order code COLL/46CT002

Fully Nonlinear Elliptic Equations

Luis A. Caffarelli and **Xavier Cabré**, *Institute for Advanced Study, Princeton, NJ*

The book marks an important stage in the theory of nonlinear elliptic problems. Its timely appearance will surely stimulate fresh attacks on the many difficult and interesting questions which remain.
— ***Bulletin of the London Mathematical Society***

Well written, with the arguments clearly presented. There are helpful remarks throughout the book, and at several points the authors give the main ideas of the more technical proofs before proceeding to the details …
— ***Bulletin of the American Mathematical Society***

This book provides a self-contained development of the regularity theory for solutions of fully nonlinear elliptic equations. Caffarelli and Cabré offer a detailed presentation of all techniques needed to extend the classical Schauder and Calderón-Zygmund regularity theories for linear elliptic equations to the fully nonlinear context.

The authors present the key ideas and prove all the results needed for the regularity theory of viscosity solutions of fully nonlinear equations. The book contains the study of convex fully nonlinear equations and fully nonlinear equations with variable coefficients.

Volume 43; 1995; 104 pages; Softcover; ISBN 0-8218-0437-5; List $29; **All AMS members $23**; Order code COLL/43CT002

Random Matrices, Frobenius Eigenvalues, and Monodromy

Nicholas M. Katz and **Peter Sarnak**, *Princeton University, NJ*

The main topic of this book is the deep relation between the spacings between zeros of zeta and L-functions and spacings between eigenvalues of random elements of large compact classical groups. This relation, the Montgomery-Odlyzko law, is shown to hold for wide classes of zeta and L-functions over finite fields. The book draws on and gives accessible accounts of many disparate areas of mathematics, from algebraic geometry, moduli spaces, monodromy, equidistribution, and the Weil conjectures, to probability theory on the compact classical groups in the limit as their dimension goes to infinity and related techniques from orthogonal polynomials and Fredholm determinants.

Volume 45; 1999; 419 pages; Hardcover; ISBN 0-8218-1017-0; List $69; **Individual member $41**; Order code COLL/45CT002

The Book of Involutions

Max-Albert Knus, *Eidgenössische Technische Hochschule, Zürich, Switzerland*, **Alexander Merkurjev**, *University of California, Los Angeles*, **Markus Rost**, *Universität Regensburg, Germany*, and **Jean-Pierre Tignol**, *Université Catholique de Louvain, Louvain-la-Neuve, Belgium*

This monograph is an exposition of the theory of central simple algebras with involution, in relation to linear algebraic groups. It provides the algebra-theoretic foundations for much of the recent work on linear algebraic groups over arbitrary fields. Involutions are viewed as twisted forms of (hermitian) quadrics, leading to new developments on the model of the algebraic theory of quadratic forms. In addition to classical groups, phenomena related to triality are also discussed, as well as groups of type F_4 or G_2 arising from exceptional Jordan or composition algebras. Several results and notions appear here for the first time, notably the discriminant algebra of an algebra with unitary involution and the algebra-theoretic counterpart to linear groups of type D_4.

Volume 44; 1998; 593 pages; Hardcover; ISBN 0-8218-0904-0; List $69; **All AMS members $55**; Order code COLL/44CT002

RECOMMENDED TEXT

Frobenius Manifolds, Quantum Cohomology, and Moduli Spaces

Yuri I. Manin, Director, *Max-Planck-Institut für Mathematik, Bonn, Germany*

This is the first monograph dedicated to the systematic exposition of the whole variety of topics related to quantum cohomology. The subject first originated in theoretical physics (quantum string theory) and has continued to develop extensively over the last decade.

The author's approach to quantum cohomology is based on the notion of the Frobenius manifold. The first part of the book is devoted to this notion and its extensive interconnections with algebraic formalism of operads, differential equations, perturbations, and geometry. In the second part of the book, the author describes the construction of quantum cohomology and reviews the algebraic geometry mechanisms involved in this construction (intersection and deformation theory of Deligne-Artin and Mumford stacks).

Yuri Manin has authored and coauthored 10 monographs and almost 200 research articles in algebraic geometry, number theory, mathematical physics, history of culture, and psycholinguistics. Manin's books have secured for him solid recognition as an excellent expositor. Undoubtedly the present book will serve mathematicians for many years to come.

Volume 47; 1999; 303 pages; Hardcover; ISBN 0-8218-1917-8; List $55; **All AMS members $44**; Order code COLL/47CT002

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