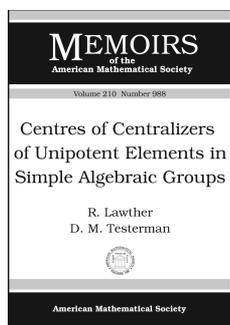


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Algebra and Algebraic Geometry



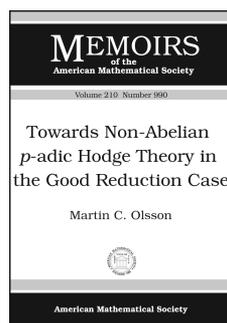
Centres of Centralizers of Unipotent Elements in Simple Algebraic Groups

R. Lawther, *Girton College, University of Cambridge, England*, and **D. M. Testerman**, *École Polytechnique Federale de Lausanne, Switzerland*

Contents: Introduction; Notation and preliminary results; Reduction of the problem; Classical groups; Exceptional groups; Nilpotent orbit representatives; Associated cocharacters; The connected centralizer; A composition series for the Lie algebra centralizer; The Lie algebra of the centre of the centralizer; Proofs of the main theorems for exceptional groups; Detailed results; Bibliography.

Memoirs of the American Mathematical Society, Volume 210, Number 988

February 2011, 188 pages, Softcover, ISBN: 978-0-8218-4769-5, LC 2010046991, 2010 *Mathematics Subject Classification*: 20G15, 20G41, **Individual member US\$49.80**, List US\$83, Institutional member US\$66.40, Order code MEMO/210/988



Towards Non-Abelian p -adic Hodge Theory in the Good Reduction Case

Martin C. Olsson, *University of California, Berkeley, CA*

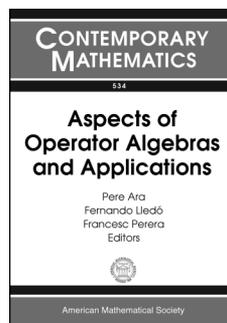
Contents: Introduction; Review of some homotopical algebra; Review of the convergent topos; Simplicial presheaves

associated to isocrystals; Simplicial presheaves associated to smooth sheaves; The comparison theorem; Proofs of 1.7–1.13; A base point free version; Tangential base points; A generalization; Appendix A. Exactification; Appendix B. Remarks on localization in model categories; Appendix C. The coherator for algebraic stacks; Appendix D. $\tilde{B}_{\text{cris}}(V)$ -admissible implies crystalline; Bibliography.

Memoirs of the American Mathematical Society, Volume 210, Number 990

February 2011, 157 pages, Softcover, ISBN: 978-0-8218-5240-8, LC 2010046756, 2010 *Mathematics Subject Classification*: 14-XX; 11-XX, **Individual member US\$46.20**, List US\$77, Institutional member US\$61.60, Order code MEMO/210/990

Analysis



Aspects of Operator Algebras and Applications

Pere Ara, *Universitat Autònoma de Barcelona, Spain*, **Fernando Lledó**, *University Carlos III de Madrid, Spain*, and **Francesc Perera**, *Universitat Autònoma de Barcelona, Spain*, Editors

This volume contains survey papers on the theory of operator algebras based on lectures given at the “Lluís Santaló” Summer School of the Real Sociedad Matemática Española, held in July 2008

at the Universidad Internacional Menéndez Pelayo, in Santander (Spain).

Topics in this volume cover current fundamental aspects of the theory of operator algebras, which have important applications such as:

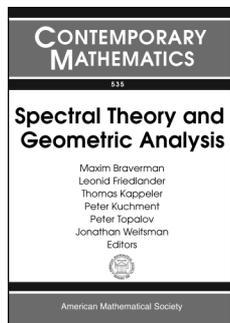
- *K*-Theory, the Cuntz semigroup, and classification for C^* -algebras
- Modular theory for von Neumann algebras and applications to quantum field theory
- Amenability, hyperbolic groups, and operator algebras.

The theory of operator algebras, introduced in the thirties by J. von Neumann and F. J. Murray, was developed in close relationship with fundamental aspects of functional analysis, ergodic theory, harmonic analysis, and quantum physics. More recently, this field has shown many other fruitful interrelations with several areas of mathematics and mathematical physics.

Contents: **P. Ara, F. Perera**, and **A. S. Toms**, *K*-theory for operator algebras. Classification of C^* -algebras; **F. Lledó**, Modular theory by example; **D. Guido**, Modular theory for the von Neumann algebras of local quantum physics; **N. P. Brown**, The symbiosis of C^* - and W^* -algebras; **P. Ara, F. Lledó**, and **F. Perera**, Appendix: Basic definitions and results for operator algebras.

Contemporary Mathematics, Volume 534

February 2011, 168 pages, Softcover, ISBN: 978-0-8218-4905-7, LC 2010030561, 2010 *Mathematics Subject Classification*: 43A07, 46L05, 46L06, 46L10, 46L35, 46L60, 46L80, 47L30, 47L90, 81T05, **AMS members US\$55.20**, List US\$69, Order code CONM/534



Spectral Theory and Geometric Analysis

Maxim Braverman, *Northeastern University, Boston, MA*, **Leonid Friedlander**, *University of Arizona, Tucson, AZ*, **Thomas Kappeler**, *University of Zürich, Switzerland*, **Peter Kuchment**, *Texas A&M University, College Station, TX*, and **Peter Topalov and Jonathan Weitsman**, *Northeastern University, Boston, MA*, Editors

This volume contains the proceedings of the conference on Spectral Theory and Geometric Analysis, held at Northeastern University, Boston, MA, from July 29–August 2, 2009, which honored Mikhail Shubin on his 65th birthday.

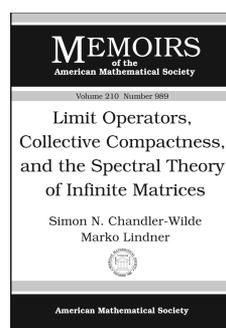
The papers in this volume cover important topics in spectral theory and geometric analysis such as resolutions of smooth group actions, spectral asymptotics, solutions of the Ginzburg–Landau equation, scattering theory, Riemann surfaces of infinite genus, tropical mathematics and geometric methods in the analysis of flows in porous media, and artificial black holes.

Contents: **P. Albin** and **R. Melrose**, Resolution of smooth group actions; **E. Aulisa**, **A. Ibragimov**, and **M. Toda**, Geometric methods in the analysis of non-linear flows in porous media; **G. Eskin**, Artificial black holes; **B. Helffer** and **Y. A. Kordyukov**, Semiclassical spectral asymptotics for a two-dimensional magnetic Schrödinger operator: The case of discrete wells; **R. O. Hryniv**,

Y. V. Mykytyuk, and **P. A. Perry**, Sobolev mapping properties of the scattering transform for the Schrödinger equation; **V. Ivrii**, Local spectral asymptotics for 2d-Schrödinger operators with strong magnetic field near the boundary; **T. Kappeler**, **P. Lohrman**, and **P. Topalov**, On normalized differentials on families of curves of infinite genus; **A. Larrain-Hubach**, **S. Rosenberg**, **S. Scott**, and **F. Torres-Ardila**, Characteristic classes and zeroth order pseudodifferential operators; **G. L. Litvinov**, Tropical mathematics, idempotent analysis, classical mechanics and geometry; **J. J. Perez**, A transversal Fredholm property for the $\bar{\partial}$ -Neumann problem on G -bundles; **T. Tzaneteas** and **I. M. Sigal**, Abrikosov lattice solutions of the Ginzburg-Landau equations.

Contemporary Mathematics, Volume 535

March 2011, 213 pages, Softcover, ISBN: 978-0-8218-4948-4, LC 2010037838, 2010 *Mathematics Subject Classification*: 30F30, 35P20, 35P25, 35Q35, 35S05, 58E15, 58J40, 58J50, **AMS members US\$63.20**, List US\$79, Order code CONM/535



Limit Operators, Collective Compactness, and the Spectral Theory of Infinite Matrices

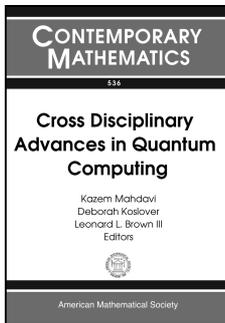
Simon N. Chandler-Wilde, *University of Reading, England*, and **Marko Lindner**, *Technical University of Chemnitz, Germany*

Contents: Introduction; The strict topology; Classes of operators; Notions of operator convergence; Key concepts and results; Operators on $\ell^p(\mathbb{Z}^N, U)$; Discrete Schrödinger operators; A class of integral operators; Some open problems; Bibliography; Index.

Memoirs of the American Mathematical Society, Volume 210, Number 989

February 2011, 111 pages, Softcover, ISBN: 978-0-8218-5243-9, LC 2010046758, 2010 *Mathematics Subject Classification*: 47A53, 47B07; 46N20, 46E40, 47B37, 47L80, **Individual member US\$42**, List US\$70, Institutional member US\$56, Order code MEMO/210/989

Applications



Cross Disciplinary Advances in Quantum Computing

Kazem Mahdavi, Deborah Koslover, and Leonard L. Brown III, University of Texas at Tyler, TX, Editors

This volume contains a collection papers, written by physicists, computer scientists, and mathematicians, from the Conference on Representation Theory, Quantum Field Theory, Category Theory, and Quantum Information Theory, which was held at the University of Texas at Tyler from October 1–4, 2009.

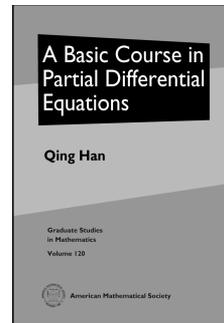
Quantum computing is a field at the interface of the physical sciences, computer sciences and mathematics. As such, advances in one field are often overlooked by practitioners in other fields. This volume brings together articles from each of these areas to make students, researchers and others interested in quantum computation aware of the most current advances. It is hoped that this work will stimulate future advances in the field.

Contents: **A. D. Ballard** and **Y.-S. Wu**, Cartan decomposition and entangling power of braiding quantum gates; **G. Chen, V. Ramakrishna**, and **Z. Zhang**, A unified approach to universality for three distinct types of 2-qubit quantum computing devices; **S. Bravyi**, Efficient algorithm for a quantum analogue of 2-SAT; **H. E. Brandt**, Quantum computational curvature and Jacobi fields; **L. H. Kauffman**, A quantum model for the Jones polynomial, Khovanov homology and generalized simplicial homology; **L. H. Kauffman** and **D. E. Radford**, Oriented quantum algebras and coalgebras, invariants of oriented 1-1 tangles, knots and links; **P. Benioff**, Space and time lattices in frame fields of quantum representations of real and complex numbers.

Contemporary Mathematics, Volume 536

March 2011, 152 pages, Softcover, ISBN: 978-0-8218-4975-0, LC 2010045181, 2010 *Mathematics Subject Classification*: 81P68, 81-01, 81-02, 81-06, **AMS members US\$47.20**, List US\$59, Order code CONM/536

Differential Equations



A Basic Course in Partial Differential Equations

Qing Han, University of Notre Dame, IN

This is a textbook for an introductory graduate course on partial differential equations. Han focuses on linear equations of first and second order. An important feature of his treatment is that the majority of the techniques are applicable more generally. In particular, Han emphasizes a priori estimates throughout the text, even for those equations that can be solved explicitly. Such estimates are indispensable tools for proving the existence and uniqueness of solutions to PDEs, being especially important for nonlinear equations. The estimates are also crucial to establishing properties of the solutions, such as the continuous dependence on parameters.

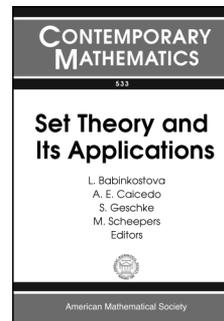
Han's book is suitable for students interested in the mathematical theory of partial differential equations, either as an overview of the subject or as an introduction leading to further study.

Contents: First-order differential equations; An overview of second-order PDEs; Laplace equations; Heat equations; Wave equations; First-order differential systems; Epilogue; Bibliography; Index.

Graduate Studies in Mathematics, Volume 120

March 2011, approximately 297 pages, Hardcover, ISBN: 978-0-8218-5255-2, LC 2010043189, 2010 *Mathematics Subject Classification*: 35-01, **AMS members US\$50.40**, List US\$63, Order code GSM/120

Logic and Foundations



Set Theory and Its Applications

L. Babinkostova and A. E. Caicedo, Boise State University, ID, S. Geschke, University of Bonn, Germany, and M. Scheepers, Boise State University, ID, Editors

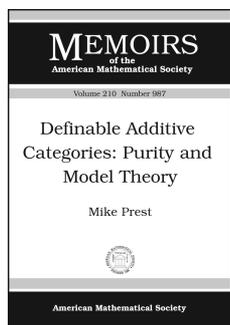
This book consists of several survey and research papers covering a wide range of topics in active areas of set theory and set theoretic topology. Some of the articles present, for the first time in print, knowledge that has been around for several years and known intimately to only a few experts. The surveys bring the reader up to date on the latest information in several areas that have been surveyed a decade or more ago. Topics covered in the volume include combinatorial and descriptive set theory, determinacy, iterated forcing, Ramsey theory, selection principles, set-theoretic topology, and universality, among others. Graduate students and researchers in logic, especially set theory, descriptive

set theory, and set-theoretic topology, will find this book to be a very valuable reference.

Contents: **M. Džamonja**, Some positive results in the context of universal models; **G. Gruenhage**, A survey of D -spaces; **M. Hrusák**, Combinatorics of filters and ideals; **R. Ketchersid**, More structural consequences of AD; **L. D. R. Kočinac**, α_1 -selection principles and games; **A. Rinot**, Jensen's diamond principle and its relatives; **J. Roitman**, Paracompactness and normality in box products: Old and new; **F. D. Tall**, Some problems and techniques in set-theoretic topology; **B. Tsaban**, Menger's and Hurewicz's problems: Solutions from "the book" and refinements; **A. E. Caicedo** and **R. Ketchersid**, A trichotomy theorem in natural models of AD^+ ; **S. Geschke**, The coinitalities of Efimov spaces; **E. Gruenhut** and **S. Shelah**, Uniforming n -place functions on well founded trees; **B. D. Miller**, A classical proof of the Kanovei-Zapletal canonization; **A. Rosłanowski** and **S. Shelah**, Lords of the iteration.

Contemporary Mathematics, Volume 533

February 2011, 307 pages, Softcover, ISBN: 978-0-8218-4812-8, LC 2010030559, 2010 *Mathematics Subject Classification*: 03C55, 03E15, 03E17, 03E35, 03E60, 46L05, 54A20, 54A25, 54D20, 91A44, **AMS members US\$84**, List US\$105, Order code CONM/533



Definable Additive Categories: Purity and Model Theory

Mike Prest, *University of Manchester, England*

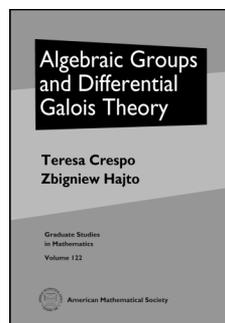
This item will also be of interest to those working in algebra and algebraic geometry.

Contents: Introduction; Preadditive and additive categories; Preadditive categories and their ind-completions; The free abelian category of a preadditive category; Purity; Locally coherent categories; Localisation; Serre subcategories of the functor category; Conjugate and dual categories; Definable subcategories; Exactly definable categories; Recovering the definable structure; Functors between definable categories; Spectra of definable categories; Definable functors and spectra; Triangulated categories; Some open questions; Model theory in finitely accessible categories; pp-Elimination of quantifiers; Ultraproducts; Pure-injectives and elementary equivalence; Imaginaries and finitely presented functors; Elementary duality; Hulls of types and irreducible types; Interpretation functors; Stability; Ranks; Bibliography.

Memoirs of the American Mathematical Society, Volume 210, Number 987

February 2011, 109 pages, Softcover, ISBN: 978-0-8218-4767-1, LC 2010046770, 2010 *Mathematics Subject Classification*: 03C60; 03C52, 16D90, 18C35, 18E05, 18E35, 18E10, **Individual member US\$42**, List US\$70, Institutional member US\$56, Order code MEMO/210/987

Number Theory



Algebraic Groups and Differential Galois Theory

Teresa Crespo, *Universitat de Barcelona, Spain*, and **Zbigniew Hajto**, *Jagiellonian University, Kraków, Poland*

Differential Galois theory has seen intense research activity during the last decades

in several directions: elaboration of more general theories, computational aspects, model theoretic approaches, applications to classical and quantum mechanics as well as to other mathematical areas such as number theory.

This book intends to introduce the reader to this subject by presenting Picard-Vessiot theory, i.e. Galois theory of linear differential equations, in a self-contained way. The needed prerequisites from algebraic geometry and algebraic groups are contained in the first two parts of the book. The third part includes Picard-Vessiot extensions, the fundamental theorem of Picard-Vessiot theory, solvability by quadratures, Fuchsian equations, monodromy group and Kovacic's algorithm. Over one hundred exercises will help to assimilate the concepts and to introduce the reader to some topics beyond the scope of this book.

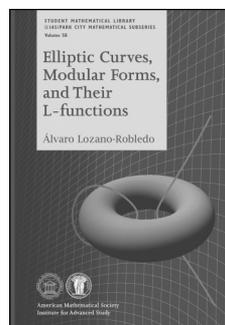
This book is suitable for a graduate course in differential Galois theory. The last chapter contains several suggestions for further reading encouraging the reader to enter more deeply into different topics of differential Galois theory or related fields.

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

Contents: *Algebraic geometry:* Affine and projective varieties; Algebraic varieties; *Algebraic groups:* Basic notions; Lie algebras and algebraic groups; *Differential Galois theory:* Picard-Vessiot extensions; The Galois correspondence; Differential equations over $\mathbb{C}(z)$; Suggestions for further reading; Bibliography; Index.

Graduate Studies in Mathematics, Volume 122

April 2011, approximately 232 pages, Hardcover, ISBN: 978-0-8218-5318-4, LC 2010044378, 2010 *Mathematics Subject Classification*: 12H05, 13B05, 14A10, 17B45, 20G15, 34M35, 68W30, **AMS members US\$42.40**, List US\$53, Order code GSM/122



Elliptic Curves, Modular Forms, and Their L-functions

Álvaro Lozano-Robledo, *University of Connecticut, Storrs, CT*

Many problems in number theory have simple statements, but their solutions require a deep understanding of algebra, algebraic geometry, complex analysis, group representations, or a combination of all four. The original simply stated problem can be

obscured in the depth of the theory developed to understand it. This book is an introduction to some of these problems, and an overview of the theories used nowadays to attack them, presented so that the number theory is always at the forefront of the discussion.

Lozano-Robledo gives an introductory survey of elliptic curves, modular forms, and L -functions. His main goal is to provide the reader with the big picture of the surprising connections among these three families of mathematical objects and their meaning for number theory. As a case in point, Lozano-Robledo explains the modularity theorem and its famous consequence, Fermat's Last Theorem. He also discusses the Birch and Swinnerton-Dyer Conjecture and other modern conjectures. The book begins with some motivating problems and includes numerous concrete examples throughout the text, often involving actual numbers, such as 3, 4, 5, $\frac{3344161}{747348}$, and $\frac{2244035177043369699245575130906674863160948472041}{8912332268928859588025535178967163570016480830}$.

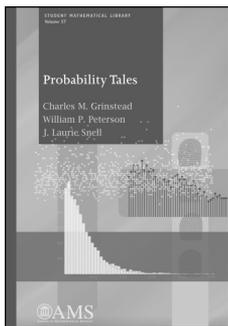
The theories of elliptic curves, modular forms, and L -functions are too vast to be covered in a single volume, and their proofs are outside the scope of the undergraduate curriculum. However, the primary objects of study, the statements of the main theorems, and their corollaries are within the grasp of advanced undergraduates. This book concentrates on motivating the definitions, explaining the statements of the theorems and conjectures, making connections, and providing lots of examples, rather than dwelling on the hard proofs. The book succeeds if, after reading the text, students feel compelled to study elliptic curves and modular forms in all their glory.

Contents: Introduction; Elliptic curves; Modular curves; Modular forms; L -functions; PARI/GP and Sage; Complex analysis; Projective space; The p -adic numbers; Parametrization of torsion structures; Bibliography; Index.

Student Mathematical Library, Volume 58

March 2011, 193 pages, Softcover, ISBN: 978-0-8218-5242-2, LC 2010038952, 2010 *Mathematics Subject Classification*: 14H52, 11G05; 11F03, 11G40, **AMS members US\$29.60**, List US\$37, Order code STML/58

Probability and Statistics



Probability Tales

Charles M. Grinstead, *Swarthmore College, PA*,
William P. Peterson, *Middlebury College, VT*, and **J. Laurie Snell**, *Dartmouth College, Hanover, NH*

This book explores four real-world topics through the lens of probability theory. It can be used to supplement a standard text in probability or statistics. Most

elementary textbooks present the basic theory and then illustrate the ideas with some neatly packaged examples. Here the authors assume that the reader has seen, or is learning, the basic theory from another book and concentrate in some depth on the following topics: streaks, the stock market, lotteries, and fingerprints. This extended format allows the authors to present multiple approaches to problems and to pursue promising side discussions in ways that

would not be possible in a book constrained to cover a fixed set of topics.

To keep the main narrative accessible, the authors have placed the more technical mathematical details in appendices. The appendices can be understood by someone who has taken one or two semesters of calculus.

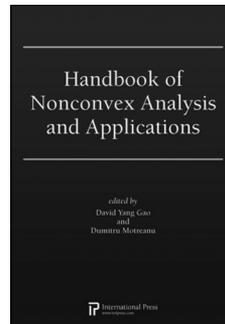
Contents: Streaks; Modeling the stock market; Lotteries; Fingerprints; Answers to John Haigh's lottery questions; Bibliography; Index.

Student Mathematical Library, Volume 57

April 2011, approximately 246 pages, Softcover, ISBN: 978-0-8218-5261-3, LC 2010038517, 2010 *Mathematics Subject Classification*: 60-01, 62-01, **AMS members US\$33.60**, List US\$42, Order code STML/57

New AMS-Distributed Publications

Analysis



Handbook of Nonconvex Analysis and Applications

David Yang Gao, *University of Ballarat, Victoria, Australia*, and **Dumitru Motreanu**, *University of Perpignan, France*, Editors

Nonconvex analysis is a rapidly developing, multi-disciplinary field of research, encompassing theoretical analysis in mathematical modelling of natural systems, bifurcation and chaos in dynamical systems, finite deformation theory, nonlinear partial differential equations, global optimization, calculus of variation, numerical methods, and scientific computations. The field of nonconvex analysis has undergone considerable development in a remarkably short time—with extensive applications to theoretical physics, material science, modern mechanics, complex systems, and scientific computations.

This volume consists of thirteen chapters written by notable experts in the field, addressing essential recent developments in nonconvex analysis and its applications and keeping a balance between major areas of theory, methods, and applications. Each chapter provides an illuminating exposition of state-of-the-art approaches to a specific topic, with discussions of the central contributions, and pointers to some basic references. A variety of topics regarding nonconvex analysis and its applications are discussed: nonconvex variational principles; comparison principles; nonlinear eigenvalue problems; critical point theory; boundary value problems; topological methods, including Morse theory; nonlinear elliptic equations; evolution problems; difference



Worldwide Search for Talent

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Please send the application with a current curriculum vitae to Human Resources Office. **Applications will be considered until positions are filled.** Please quote the reference of the post in the application and on the envelope. The University reserves the right to consider late applications and nominations, and not to fill the positions. Personal data provided by applicants will be used for recruitment and other employment-related purposes. The University is an equal opportunity employer.

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New AMS-Distributed Publications

equations; inequality problems; geometric properties of functions and spaces; and applications in mechanics.

This handbook will serve as a much-needed reference work for the dynamic and ever-growing field of nonconvex analysis and its applications.

A publication of International Press. Distributed worldwide by the American Mathematical Society.

Contents: **G. Bonanno** and **P. Candito**, Nonlinear difference equations through variational methods; **S. Carl** and **D. Motreanu**, Sub-supersolution method for multi-valued elliptic and evolution problems; **G. Colombo** and **L. Thibault**, Prox-regular sets and applications; **L. Gasinski** and **N. S. Papageorgiou**, Multiplicity of solutions for nonlinear elliptic equations with combined nonlinearities; **A. Kristály** and **N. S. Papageorgiou**, Study of some semilinear elliptic problems on \mathbb{R}^n via variational methods; **V. K. Le** and **K. Schmitt**, Equations and inequalities in Orlicz-Sobolev spaces: Selected topics; **R. Livrea** and **S. A. Marano**, Non-smooth critical point theory; **S. Migórski**, Evolution hemivariational inequalities with applications; **K. Perera**, Morse theory and applications to variational problems; **E. Rentsen**, Quasiconvex optimization and its applications; **B. Ricceri**, Nonlinear eigenvalue problems; **A. Szulkin** and **T. Weth**, The method of Nehari manifold; **Z. Zhang**, Solutions for elliptic problems with precise sign information.

International Press

November 2010, 680 pages, Hardcover, ISBN: 978-1-57146-200-8, 2010 *Mathematics Subject Classification*: 35Jxx, 35Kxx, 47Jxx, 47Nxx, 49Jxx, 49Mxx, 58Exx, 58Jxx, 90Cxx, **AMS members US\$71.20**, List US\$89, Order code INPR/93