

New and Forthcoming

The Center and Cyclicity Problems

A Computational Algebra Approach

Valery Romanovski, University of Maribor, Slovenia; **Douglas Shafer**, University of North Carolina at Charlotte, NC, USA

Using a computational algebra approach, this work addresses the center and cyclicity problems as behaviors of dynamical systems and families of polynomial systems. The text first lays the groundwork for computational algebra and gives the main properties of ideals in polynomial rings and their affine varieties followed by a discussion on the theory of normal forms and stability. The center and cyclicity problems are then explored in detail. Containing exercises as well as historical notes and algorithms, this self-contained text is suitable for an advanced graduate course in the subject as well as a reference for researchers.

2009. XVI, 330 P. 4 ILLUS. SOFTCOVER
ISBN: 978-0-8176-4726-1 CA. \$ 59.95

Global Propagation of Regular Nonlinear Hyperbolic Waves

Tatsien Li; Libin Wang, Fudan University, Shanghai, China

This monograph describes global propagation of regular nonlinear hyperbolic waves described by first-order quasilinear hyperbolic systems in one dimension. The exposition is clear, concise, and unfolds systematically beginning with introductory material and leading to the original research of the authors. A systematic theory is established—by means of the concept of weak linear degeneracy and the method of (generalized) normalized coordinates—for the global existence and blow-up mechanism of regular nonlinear hyperbolic waves with small amplitude for the Cauchy problem and many other problems.

2009. APPROX. 365 P. HARDCOVER
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PROGRESS IN NONLINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS

Number Theory

Structures, Examples, and Problems

Titu Andreescu, The University of Texas at Dallas, Richardson, TX, USA; **Dorin Andrica**, 'Babes-Bolyai' University, Cluj-Napoca, Romania

This introductory textbook takes a problem-solving approach to number theory, situating each concept within the framework of an example or a problem for solving. Starting with the essentials, the text covers divisibility, unique factorization, modular arithmetic and the Chinese Remainder Theorem, Diophantine equations, binomial coefficients, Fermat and Mersenne primes and other special numbers, special sequences, and problems of density. Included are sections on mathematical induction and the pigeonhole principle, as well as a discussion of other number systems.

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Mathematical Analysis

An Introduction to Functions of Several Variables

Mariano Giaquinta, Scuola Normale Superiore, Pisa, Italy; **Giuseppe Modica**, Università di Firenze, Italy

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Silvia Bertoluzza, CNR, Pavia, Italy; **Silvia Falletta**, Politecnico di Torino, Italy; **Giovanni Russo**, University of Catania, Italy; **Chi-Wang Shu**, Brown University, Providence, RI, USA

This volume offers researchers the opportunity to catch up with important developments in the field of numerical analysis and scientific computing. The book is comprised of three parts. The first one is devoted to the use of wavelets to derive some new approaches in the numerical solution of PDEs, showing in particular how the possibility of writing equivalent norms for the scale of Besov spaces allows for the development of some new methods. The second part provides an overview of the modern finite-volume and finite-difference shock-capturing schemes for systems of conservation and balance laws, with emphasis on providing a unified view of such schemes by identifying the essential aspects of their construction. In the last part a general introduction is given to the discontinuous Galerkin methods for solving some classes of PDEs, discussing cell entropy inequalities, nonlinear stability and error estimates.

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