Theoretical Numerical Analysis: An Introduction to Advanced Techniques


Numerical Analysis: Walter Gautschi 2015-12-07 Revised and updated, this second edition of Walter Gautschi's successful textbook explores computational methods for problems arising in the areas of classical analysis, approximation theory, and ordinary differential equations, among others. Topics included in the book are presented with a view toward stressing basic principles and maximizing readability and teachability as far as possible, while subjects requiring a higher level of technicality are referenced in detailed bibliographic notes at the end of each chapter. Readers are thus given the guidance and opportunity to pursue advanced modern topics in more depth. Along with updated references, new biographical notes, and enhanced mathematical clarity, this second edition includes the expansion of an already large collection of exercises and assignments, only the best that deal with theoretical and practical aspects of the subject and those requiring machine computation and the use of mathematical software. Perhaps most notably, the edition also comes with a complete solutions manual, carefully developed and published by the author, which will serve as an exceptionally valuable resource for instructors.

Classical and Modern Numerical Analysis: Theory, Methods and Practice provides a solid foundation in numerical analysis for more specialized topics, such as finite element theory, advanced numerical linear algebra, and optimization. It prepares graduate students for taking doctoral examinations in numerical analysis. The text covers the main core of Numerical Analysis: Walter Gautschi 1988-08-07 A careful introduction to numerical analysis, featuring an algorithmic approach. Provides the theoretical basis of each technique, then develops algorithms that are easily implemented on any personal computer. Methods of numerical analysis covered include systems of linear equations, nonlinear equations, interpolation, approximation, and numerical differentiation and integration. Numerical Analysis of Wavelet Methods: Albert Cohen 2003-06-26 This book presents the theoretical foundations of wavelet methods and their applications to numerical analysis. It covers the main concepts of wavelet methods: multiresolution analysis, orthonormal bases of wavelets, and wavelet transforms. The book emphasizes the close connection between the approximation properties of wavelet bases and their numerical performance, and develops approximation theory and function spaces, and plays a central role in the analysis of wavelet-based numerical methods. This book offers a self-contained treatment of wavelets, which includes the theoretical pillar and its applications to the numerical solution of partial differential equations. In key features are: 1. A self-contained introduction to wavelet bases and related numerical algorithms, from the simplest examples to the most sophisticated ones. 2. Full treatment of the theoretical foundations that are crucial for the analysis of wavelets and other related multiscale methods: function spaces, linear and multilinear approximation, interpolation theory. 3. Applications of these concepts to the numerical treatment of partial differential equations: multilevel preconditioning, sparse approximations of differential and integral operators, adaptive discretization strategies.

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