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Numerical Ysis Of Spectral Methods

Description: on electron-probe formation; the effect of elastic and inelastic scattering processes on electron diffusion and electron range; charging and radiation damage effects; the dependence of SE ...

Completely revised text applies spectral methods to boundary value, eigenvalue, and time-dependent problems, but also covers cardinal functions, matrix-solving methods, coordinate transformations, much more. Includes 7 appendices and over 160 text figures.

This text presents the key findings of the International Symposium held in Delft in 2003, which explored the process of shallow flows. Shallow flows are found in lowland rivers, lakes, estuaries, bays, coastal areas and in density-stratified atmospheres, and may be observed in puddles, as in oceans. They impact

Applications of Numerical Methods in Molecular Spectroscopy provides a mathematical background, theoretical perspective, and review of spectral data processing methods. The book discusses methods of complex spectral profile separation into bands, factor analysis methods, methods of quantitative analysis in molecular spectroscopy and reflectance spectroscopy, and new data processing methods. Mathematical methods in special areas of molecular spectroscopy, such as color science, electron spin resonance, and nuclear magnetic resonance spectroscopies are also covered. The book will benefit researchers and postgraduate students in fields of chemistry, physics, and biology.

The current rapid and complex advancement applications of electromagnetic (EM) and optical systems calls for a much needed update on the computational methods currently in use. Completely revised and reflecting ten years of developments, this second edition of the bestselling Computational Methods for Electromagnetic and Optical Systems provides the update so desperately needed in this field. Offering a wealth of new material, this second edition begins with scalar wave propagation and analysis techniques, chiral and metamaterials, and photonic band gap structures. It examines Poynting vector and stored energy, as well as energy, group, and phase velocities; reviews k-space state variable formation with applications to anisotropic planar systems; and presents full-field rigorous coupled wave analysis of planar diffraction gratings with applications to H-mode, E-mode, crossed gratings, single and multilayered diffraction grating analysis, and diffraction from anisotropic gratings. Later chapters highlight spectral techniques and RCWA as applied to the analysis of dynamic wave-mixing in PR materials with induced transmission and reflection gratings and demonstrate the RCWA algorithm to analyze cylindrical and spherical systems using circular, bipolar cylindrical, and spherical coordinates. The book concludes with several RCWA computational case studies involving scattering from spatially inhomogeneous eccentric circular cylinders, solved in bipolar coordinates. Many of these examples apply the complex Poynting theorem or the forwardscattering (optical) theorem to validate numerical solutions by verifying power conservation. Using common computational tools such as Fortran, MATLAB, COMSOL, and RSOFTE, the text offers numerous examples to illuminate the material, many of which employ a full-field vector approach to analyze and solve Maxwell's equations in anisotropic media where a standard wave equation approach is intractable. Designed to introduce novel spectral computational techniques, the book demonstrates the application of these methods to analyze a variety of EM and optical systems.

This text examines a variety of spectral computational techniques— including k-space theory, Floquet theory and beam propagation— that are used to analyze electromagnetic and optical problems. The authors tie together different applications in EM and optics in which the state variable method is used. Emphasizing the analysis of planar diffraction gratings using rigorous coupled wave analysis, the book presents many cases that are analyzed using a full-field vector approach to solve Maxwell's equations in anisotropic media where a standard wave equation approach is intractable.

The new edition of the popular introductory textbook on numerical approximation methods and mathematical analysis, with a unique emphasis on real-world application An Introduction to Numerical Methods and Analysis helps students gain a solid understanding of a wide range of numerical approximation methods for solving problems of mathematical analysis. Designed for entry-level courses on the subject, this popular textbook maximizes teaching flexibility by first covering basic topics before gradually moving to more advanced material in each chapter and section. Throughout the text, students

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are provided clear and accessible guidance on a wide range of numerical methods and analysis techniques, including root-finding, numerical integration, interpolation, solution of systems of equations, and many others. This fully revised third edition contains new sections on higher-order difference methods, the bisection and inertia method for computing eigenvalues of a symmetric matrix, a completely re-written section on different methods for Poisson equations, and spectral methods for higher-dimensional problems. New problem sets—ranging in difficulty from simple computations to challenging derivations and proofs—are complemented by computer programming exercises, illustrative examples, and sample code. This acclaimed textbook: Explains how to both construct and evaluate approximations for accuracy and performance Covers both elementary concepts and tools and higher-level methods and solutions Features new and updated material reflecting new trends and applications in the field Contains an introduction to key concepts, a calculus review, an updated primer on computer arithmetic, a brief history of scientific computing, a survey of computer languages and software, and a revised literature review Includes an appendix of proofs of selected theorems and a companion website with additional exercises, application models, and supplemental resources An Introduction to Numerical Methods and Analysis, Third Edition is the perfect textbook for upper-level undergraduate students in mathematics, science, and engineering courses, as well as for courses in the social sciences, medicine, and business with numerical methods and analysis components.

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