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Parallel Solution of Integral Equation-Based EM Problems in the Frequency Domain Stochastic Dynamic Filtering and Optimization Frontiers of Computational Fluid Dynamics 1998 Mechanics of Composite Materials Work, Workflow and Information Systems The Art of Wireless Sensor Networks Scattering, T Volume Set Helix: The Capstone Research Journal of Ivy Collegiate School Equations in Free Semigroups Three-dimensional Electromagnetics Circuit Oriented Electromagnetic Modeling Using the PEEC Technique The Eleventh Marcel Grossmann Meeting Principles of Surface-Enhanced Raman Spectroscopy Image Analysis Information Control Problems in Manufacturing 2006 Exact Solutions in Three-Dimensional Gr Advances in Modeling and Interpretation in Near Surface Geophysics Proceedings of the Ninth Confere Quantum Field Theory Under the Influence of External Conditions (QFEXT09) Quantum Field Theory Und the Influence of External Conditions (QFEXT09) Toward Robust Entity Matching Solutions for Structur and Textual Data Chemical Hydrometallurgy: Theory And Principles Case-Based Reasoning Research and Development Computational Methods for Electromagnetic and Optical Systems, Second Edition Procee of the Sixth SIAM International Conference on Data Mining Recent Developments in General Relativity,Genoa 2000 Academic Scientists at Work Electromagnetic Radiation, Scattering, and Diffract Computational Methods for Electromagnetic and Optical Systems, Second Edition Handbook of Nonline Partial Differential Equations, Second Edition Stochastic Differential Equations with Markovian Switchin Research in Computational Molecular Biology The Department of Energy's FY 1997 Budget Request for Environment, Safety and Health, Environmental Restoration and Waste Management (non-defense) and Nuclear Energy Introduction to Microwave Imaging Physical Chemistry : Solutions Manual Electromagn Methods in Applied Geophysics Electromagnetic Shielding Improving the Environment IRT from SSI Psychometrics Terra Preta

This volume, representing a compilation of authoritative reviews on a multitude of uses of statistics in epidemiology and medical statistics written by internationally renowned experts, is addressed to statisticians working in biomedical and epidemiological fields who use statistical and quantitative methods in their research. While the use of statistics in these fields has a long and rich history, explosive growth of science in general and clinical and epidemiological sciences in particular have gone through a sea of change, spawning the development of new methods and innovative adaptations of standard methods. Since the literature is scattered, the Editors have undertaken this humble exercise to document a representative collection of interest of broad interest to diverse users. The volume spans a cross section of standard topics oriented toward the current evolving field, as well as special topics in much need which have more recent origins. This volume was prepared especially keeping the applied statisticians in mind, emphasizing applications-oriented methods and techniques, including references to appropriate software when relevant. The contributors are internationally renowned experts in their respective areas. This volume addresses emerging statistical challenges in epidemiological, biomedical, and pharmaceutical research. It features: methods for assessing Biomarkers; analysis of competing risks; clinical trials including sequential and group sequential, crossover designs, randomized, and adaptive designs; and, structural equations modelling and longitudinal data analysis. SERS was discovered in the 1970s and has since grown enormously in breadth, depth, and understanding. One of the major characteristics of SERS is its interdisciplinary nature: it lies at the boundary between physics, chemistry, colloid science, plasmonics, nanotechnology, and biology. By their very nature, it is impossible to find a textbook that will summarize the principles needed for SERS of these rather dissimilar and disconnected fields. Although a basic understanding of these topics is necessary for research projects in SERS with all its diverse aspects and applications, they are seldom touched upon as a coherent unit during most undergraduate education in physics or chemistry. This book intends to fill this existing gap in the literature. It provides an overview of the underlying principles of SERS, from the fundamental understanding of the effect to its potential applications. It is aimed primarily at newcomers to the field, graduate students, researchers or scientists.

attracted by the many applications of SERS and plasmonics or its basic science. The emphasis is on concepts and background material for SERS, such as Raman spectroscopy, the physics of plasmons, or colloid science. All of them are introduced within the context of SERS, and from where the more specialized literature can be followed. Represents one of very few books fully dedicated to the topic of surface-enhanced Raman spectroscopy (SERS) Gives a comprehensive summary of the underlying physical concepts around SERS Provides a detailed analysis of plasmons and plasmonics A survey of the most recent developments in relativity and in the theory of the unification of Fundamental Interactions is presented in this book. Theoretical results, the cosmological and astrophysical aspects, the experimental and observational progress are shown in 26 general talks by renowned scientists active in this field. The Sixth SIAM International Conference on Data Mining continues the tradition of presenting approaches, tools, and systems for data mining in fields such as science, engineering, industrial processes, healthcare, and medicine. The datasets in these fields are large, complex, and often noisy. Extracting knowledge requires the use of sophisticated performance, and principled analysis techniques and algorithms, based on sound statistical foundations. These techniques in turn require powerful visualization technologies; implementations that must be carefully designed for performance; software systems that are usable by scientists, engineers, and physicians as well as researchers; and infrastructures that support them. During the last one and a half decades, wireless sensor networks have witnessed significant growth and tremendous development in both academia and industry. A large number of researchers, including computer scientists and engineers, have been interested in solving challenging problems that span all the layers of the protocol stack of sensor networking systems. Several venues, such as journals, conferences, and workshops, have been launched to cover innovative research and practice in this promising and rapidly advancing field. Because of these trends, I thought it would be beneficial to provide our sensor networks community with a comprehensive reference on as much of the findings as possible on a variety of topics in wireless sensor networks. As this area of research is in continuous progress, it does not seem to be a reasonable solution to keep delaying the publication of such reference any more. This book relates to the second volume and focuses on the advanced topics and applications of wireless sensor networks. Our rationale is that the second volume has all application-specific and non-conventional sensor networks, emerging techniques and advanced topics that are not as matured as what is covered in the first volume. Thus, the second volume deals with three-dimensional, underground, underwater, body-mounted, and societal networks. Following Donald E. Knuth's above-quoted elegant strategy to focus on several important fields (The Art of Computer Programming: Fundamental Algorithms, 1997), all the book chapters in this second volume include up-to-date research work spanning various topics, such as stochastic modeling, barrier coverage, spatiotemporal coverage, tracking, estimation, counting, coverage and localization in three-dimensional sensor networks, topology control and routing in three-dimensional sensor networks, underground and underwater sensor networks, multimedia and body sensor networks, and social sensing. Most of these major topics are covered in an advanced course on wireless sensor networks. This book will be an excellent source of information for graduate students majoring in computer science, computer engineering, electrical engineering, or any related discipline. Furthermore, computer scientists, researchers, and practitioners in both academia and industry will find this book useful and interesting. Covers the major techniques used to compute, visualize, and understand 3D electromagnetic fields in every major application of electrical geophysics. The papers written for this volume, representing 95 authors from 56 institutions in 13 countries, are divided between techniques of 3D modelling and inversion and applications. "This monography deals with equations in a free semigroup with a finite number of generators." Introduction. This book deals primarily with theoretical aspects of advances in near surface geophysical data modeling, different interpretation techniques, near surface and an integrated study to delineate the subsurface structures. It also involves the practical application of different geophysical methods to delineate the subsurface structures associated with mineral, groundwater exploration, subsurface contamination, hot springs, coal fire etc. This book is specifically aimed with the state-of-art information regarding research advances and new developments in these areas of study, coupled with extensive modeling and field investigations obtained from around the world. It is extremely enlightening for the research workers, scientists, faculty members and students, in Applied Geophysics, Near Surface Geophysics, Potential Field, Electrical and Electromagnetic Methods, Mathematical Modeling Techniques

Earth Sciences, as well as Environmental Geophysics. "Terra preta, meaning "black earth" in Portuguese, is a very dark, fertile soil first made by the original inhabitants of the Amazon Basin at least 2,500 years ago. According to a growing community of international scientists, this ancient soil, sometimes referred to as biochar, could solve two of the greatest problems facing the world: climate change and the hunger crisis. This comprehensive book condenses everything we know about terra preta and provides instructions for how to make it. Both passionate and practical, the book offers indispensable advice for how to create a better future from the ground up."-- This book constitutes the refereed proceedings of the 11th Annual International Conference on Research in Computational Molecular Biology, RECOMB 2007, held in Oakland, CA, USA from April 1-5, April 2007. The 37 revised full papers address all current issues in algorithmic, theoretical, and experimental bioinformatics. A step-by-step guide to parallelizing cem codes The future of computational electromagnetics is changing drastically as the new generation of computer chips evolves from single-core to multi-core. The burden now falls on software programmers to revamp existing codes and add new functionality to enable computational codes to run efficiently on this new generation of multi-core CPUs. In this book, you'll learn everything you need to know to deal with multi-core advances in chip design by employing highly efficient parallel electromagnetic code. Focusing only on the Method of Moments (MoM), the book covers: In-Core and Out-of-Core LU Factorization for Solving a Matrix Equation A Parallel MoM Code Using RWG Basis Functions and ScaLAPACK-Based In-Core and Out-of-Core Solvers A Parallel MoM Code Using Higher-Order Basis Functions and ScaLAPACK-Based In-Core and Out-of-Core Solvers Turning the Performance of a Parallel Integral Equation Solver Refinement of the Solution Using the Conjugate Gradient Method A Parallel MoM Code Using Higher-Order Basis Functions and Plapack-Based In-Core and Out-of-Core Solvers Applications of the Parallel Frequency Domain Integral Equation Solver Appendices are provided to provide detailed information on the various computer platforms used for computation; a demo shows you how to compile ScaLAPACK and PLAPACK on the Windows® operating system; and a demo parallel source code is available to solve the 2D electromagnetic scattering problems. Parallel Solution of Integral Equation-Based EM Problems in the Frequency Domain is indispensable reading for computational code designers, computational electromagnetics researchers, graduate students, and anyone working with CEM software. This volume brings together several perspectives on the nature of work processes in enterprises and how information systems can best support these processes. The genesis of this idea was the shared interest of the authors in how enterprises improve and change. The shared belief is that change of enterprises relates to change of work processes and the success of such changes relates to how work processes are supported by information systems. Thus, the papers in this volume address both the nature of work and the design of information systems to support work. This volume is divided into two main sections: work and workflow in information systems. There are three papers in each section. The disciplines represented across these papers include management, engineering, computing, and architecture. These four disciplines pursue work, workflow, and information systems from quite different perspectives - management to represent business practices and processes, engineering to represent the physical flows in the system, computing to represent information flows, and architecture to represent human flows within and among physical spaces. Enterprises, of course, include all these types of flows. Hydrometallurgy is a field of chemical technology concerned with the production of metals from their ores and secondary sources. Modern hydrometallurgy began with the development to obtain uranium in the 1940s and extended into new areas with the development of pressure hydrometallurgy in the mid-1950s and acceptance of solvent extraction as an industrial scale process for copper production in the late 1960s to early 1970s. With the introduction of new processes for many metals, the present development of hydrometallurgy has come to maturity and a survey of the current state of the field is timely. This book is derived from the lectures on the principles on which hydrometallurgical processes are based, given as part of the undergraduate and MSc courses in hydrometallurgy which Professor A R Burkin gave from 1961 until he retired in 1988. Professor Burkin's earlier book, *The Chemistry of Hydrometallurgical Processes*, was regarded as the major work in the field. This is his long awaited new textbook. /a A on-line tutorial for beginners covering the fundamentals of microwave imaging, including application examples and practical exercises. Information Control Problems in Manufacturing 2006 contains the Proceedings of the 12th IFAC Symposium on Information Control Problems in Manufacturing (INCOM'2006). This symposium

took place in Saint Etienne, France, on May 17-19 2006. INCOM is a tri-annual event of symposia series organized by IFAC and it is promoted by the IFAC Technical Committee on Manufacturing Plant Control. The purpose of the symposium INCOM'2006 was to offer a forum to present the state-of-the-art in international research and development work, with special emphasis on the applications of optimisation methods, automation and IT technologies in the control of manufacturing plants and the entire supply chain within an enterprise. The symposium stressed the scientific challenges and issues, covering the whole product and processes life cycle, from the design through the manufacturing and maintenance, to the distribution and after service. INCOM'2006 Technical Program also included a special event on Innovative Engineering Techniques in Healthcare Delivery. The application of engineering and IT methods in medicine is a rapidly growing field with many opportunities for innovation. The Proceedings are composed of 3 volumes: Volume 1 - Information Systems, Control & Interoperability Volume 2 - Industrial Engineering Volume 3 - Operational Research. This 3-volume set, containing 362 carefully reviewed and selected papers * presenting the state-of-the-art in international research and development in Information Control problems in Manufacturing Helix is the Capstone Research journal of Ivy Collegiate School. Student researchers conduct annual research projects in an area of their choosing. Selected presentations and papers are published in this journal. Research topics range greatly in approach and field. Topics range from questions in the life sciences to studies in musicology.

Description of the four Item Response Theory (IRT) computer programs developed by R. Darrell Bock, BME, MG, MULTILog, PARSCALE, and TESTFACT. Includes descriptions of the programs, examples of use, and input commands. This textbook provides the first systematic presentation of the theory of stochastic differential equations with Markovian switching. It presents the basic principles at an introductory level but emphasizes current advanced level research trends. The material takes into account all the features of Ito equations with Markovian switching, interval systems and time-lag. The theory developed is applicable in different and complicated situations in many branches of science and industry. Scattering is the collision of two objects, which results in a change of trajectory and energy. For example, in particle physics, such as electrons, photons and neutrons are "scattered off" of a target specimen, resulting in a different energy and direction. In the field of electromagnetism, scattering is the random diffusion of electromagnetic radiation from air masses is the long-range sending of radio signals over geographic obstacles such as mountains. This type of scattering applied to the field of acoustics, is the spreading of sound in many directions due to irregularities in the transmission medium. Volume I of Scattering will be devoted to basic theoretical ideas, approximation methods, numerical techniques and mathematical modeling. Volume II will be concerned with basic experimental techniques, technological practices, and comparisons with relevant theoretical work including seismology, medical applications, meteorological phenomena and astronomy. This reference will be useful for researchers and graduate students in physics, applied physics, biophysics, chemical physics, medical physics, acoustics, geosciences, optics, mathematics, and engineering. This is the first encyclopedic-range work on the topic of scattering theory in quantum mechanics, elastodynamics, acoustics, and electromagnetics. It provides a comprehensive interdisciplinary presentation of scattering and inverse scattering theory and applications in a wide range of scientific fields, with an emphasis, and details, up-to-date developments. Scattering also includes an emphasis on the problems that are still in active current research. The first interdisciplinary reference source on scattering to gather all world expertise in this technique Covers the major aspects of scattering in a common language, helping to widening the knowledge of researchers across disciplines The list of editors, associate editors and contributors reads like an international Who's Who in the interdisciplinary field of scattering Bridges the gap between electromagnetics and circuits by addressing electromagnetic modeling using the Partial Element Equivalent Circuit (PEEC) method This book provides intuitive solutions to electromagnetic problems by using the Partial Element Equivalent Circuit (PEEC) method. This book begins with an introduction to circuit analysis techniques, laws, and frequency and time domain analyses. The authors also treat Maxwell's equations, capacitance computations, and inductance computations through the lens of the PEEC method. Next, readers learn to build PEEC models in various forms: equivalent circuit models, non-orthogonal PEEC models, skin-effect models, PEEC models for dielectrics, incident and radiating field models, and scattering PEEC models. The book concludes by considering issues like stability and passivity, and includes five appendices some with formulas for partial elements. Leads readers to the

of a multitude of practical problems in the areas of signal and power integrity and electromagnetic interference. Contains fundamentals, applications, and examples of the PEEC method. Includes detailed mathematical derivations. Circuit Oriented Electromagnetic Modeling Using the PEEC Techniques is a reference for students, researchers, and developers who work on the physical layer modeling of IC interconnects and Packaging, PCBs, and high speed links. A guide for scientists on the journey from the end of a postdoctoral career to the point of promotion to Associate Professor, this 2nd edition focuses on three aspects of an academic setting: Scholarship, Teaching, and Service. Valuable advice is provided on such topics as choosing and landing an academic job; setting up and managing the lab; obtaining funds; organizing, writing, and publishing your work; teaching and mentoring; and the promotion and tenure process. Comprehensive Resource for Understanding Electromagnetic Shielding Concepts and Recent Developments in the Field. This book describes the fundamental, theoretical, and practical aspects to approach electromagnetic shielding with a problem-solving mind, either at a design stage or in the context of an issue-fixing analysis of an existing configuration. It examines the main shielding mechanisms and how to analyze any shielding configuration, taking into account all the involved aspects. A detailed discussion on the possible choices of parameters suitable to ascertain the performance of a given shielding structure is also presented by considering either a continuous wave EM field source or a transient one. To aid in reader comprehension, both a theoretical and practical engineering point of view are presented with several examples and applications included at the end of the main chapters. Sample topics discussed in the book include: Concepts in transient shielding including performance parameters and canonical configurations. Time domain performance of shielding structures, shields, and overall performance of shielding enclosures (cavities). How to install adequate barriers around the most sensitive components/systems to reduce or eliminate interference. Details on solving core fundamental issues for electronic and telecommunications systems via electromagnetic shielding. For industrial researchers, telecommunications/electrical engineers, and academics studying the design of EM shielding structures, this book serves as an important resource for understanding both the logistics and practical applications of electromagnetic shielding. It also includes all recent developments in the field to help professionals stay at the cutting edge of the curve in their respective disciplines. 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 scattering, propagation and analysis techniques, chiral and metamaterials, and photonic band gap structures. It examines the 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 and circular cylinders, solved in bipolar coordinates. Many of these examples apply the complex Poynting theorem or the forward scattering (optical) theorem to validate numerical solutions by verifying power conservation. Using common computational tools such as Fortran, MATLAB, COMSOL, and RSOFT, 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 coupled wave analysis, the book presents many cases that are analyzed using a full-field vector approach.

solve Maxwell's equations in anisotropic media where a standard wave equation approach is intractable. Everyone involved with the mechanics of composite materials and structures must have come across the work of Dr. N.J. Pagano in their research. His research papers are among the most referenced of all existing literature in the field of mechanics of composite materials. This monograph makes available, in one volume, Dr. Pagano's major technical papers. Most of the papers included in this volume have been published in the open literature, but there are a few exceptions -- a few key, unpublished reports have been included to provide continuity. The topics are: some basic studies of anisotropic behavior, exact solutions for elastic response of micromechanics, and some carbon-carbon spinoffs. The volume can be used as a reference book by researchers in academia, industry, and government laboratories, and it can be used as a reference text for a graduate course on the mechanics of composite materials.

Entity matching (EM) is the task of finding records that refer to the same real-world entity. There have been many EM solutions proposed over the past decades. In real applications, oftentimes the developed solutions provide reasonable results. However, there are still many limitations that prevent these solutions from delivering good performance for certain application scenarios. In this dissertation we focus on three limitations: limited support for debugging blocking, difficulties in handling structured but dirty data, and difficulties in handling textual data. To address the first limitation, we develop MatchCatcher for debugging blocking, and implement an open-source tool. The tool has been integrated into the Magellan EM system and used extensively with overwhelmingly positive feedback. To address the second and third limitations, I explore deep learning (DL) for EM. Specifically, I first focus on the matching step in EM, by exploring a DL design space for matching and conducting extensive evaluation. The results show that DL does not outperform the current EM solutions on structured data, but can significantly outperform them on textual and dirty data. Then I apply DL to blocking, by exploring a DL design space for debugging blocking. Comparing against non-DL state-of-the-art solutions, the results show that it is not clear whether DL will help blocking on structured data, but it provides better blocking results on textual and dirty data. Finally, we show that with GPU acceleration, the proposed DL solutions can be executed efficiently. The refereed proceedings of the 5th International Conference on Case-Based Reasoning, ICCBR 2003, held in Trondheim, Norway, in June 2003. The 51 revised full papers presented were carefully reviewed and selected from 150 submissions. All current aspects of CBR are addressed including case representation, similarity retrieval, case adaptation, case library maintenance, multi-agent collaborative systems, data mining, soft computing, recommender systems, knowledge management, legal reasoning, software reuse, and music. This book introduces essential concepts in stochastic processes that interface seamlessly with applications of information science and engineering. This book addresses remedial action and waste management problems that the United States and the nation are now facing that are the result of 50 years of nuclear weapons development and testing -- "problems that require a reengineering of systems and a reexamination of the scientific, engineering, and institutional barriers to achieving cost-effective and safe stewardship of the nation's resources. In the Environment evaluates the DOE's environmental management program in four areas: regulatory measures, organization and management, priority-setting, timing and staging, and science and technology.

Automatic image analysis has become an important tool in many fields of biology, medicine, and other sciences. Since the first edition of *Image Analysis: Methods and Applications*, the development of both software and hardware technology has undergone quantum leaps. For example, specific mathematical filters have been developed for quality enhancement of original images and for extraction of specific features of interest. More complex programs have been developed for the analysis of object forms in distinguishing cancer cells from normal tissue cells. Just as significant, three-dimensional analysis of proteins, organelles, or macromolecules is even more complex. In addition, recent space-based experiments have optimized techniques for the extraction of movement parameters of numerous motile objects. The second edition of *Image Analysis: Methods and Applications* addresses all these new developments. Moreover, two new chapters have been added. One focuses on images on the internet, and the other discusses microscope image restoration. These chapters add significantly to the existing body of information on Internet communication protocol and environmental considerations as well as to that on image file formats considerations. The materials also include a list of internet Web pages that pertain to digital images and software along with those that relate to image processing. With these considerations in mind, *Image Analysis: Methods and Application, Second Edition* is of incalculable value.

professionals, academics, and users of all aspects of image analysis in biology and other areas of science. The first volume of *Frontiers of Computational Fluid Dynamics* was published in 1994 and was dedicated to Antony Jameson. The present volume is dedicated to Prof Earl Murman in appreciation of his original contributions to this field. The book covers the following topics: Transonic and Hypersonic Aerodynamics, Algorithm Developments and Computational Techniques, Impact of High Performance Computing, Applications in Aeronautics and Beyond, Industrial Perspectives, Engineering Education. The book contains 25 chapters written by leading researchers from academia, government laboratories, and industry. Each chapter is self-contained and unique text systematically presenting the determination and classification of exact solutions in three-dimensional Einstein gravity. Including contributions by David Chow, Christopher N. Pope and I. S. Sezgin (chapters 16-19).

QFEXT is the leading international conference held every two years, highlighting progress in quantum vacuum energy phenomena, the Casimir effect, and related topics, both experimentally and theoretically. Most of the key players in the field are expected to be present. Thus the proceedings are the definitive source of information on this field, which is playing an increasingly important role in nanotechnology and in understanding fundamental issues in physics such as renormalization and in the search for new physics such as fifth forces and dark energy. Proceedings of previous conferences in the field have been important, and like the conferences they summarize, have led to major progress in the two subsequent years. This is because, the fundamental aspects of quantum field theory; applications of a wide range of branches of physics, chemistry, nanoscience, and astrophysics; mathematical and experimental techniques described have wide applications and all leading groups and scientists working in this field will be represented.

New to the Second Edition More than 1,000 pages with over 1,500 new first-, second-, third-, fourth-, and higher-order nonlinear equations with solutions. Parabolic, hyperbolic, elliptic, and other systems of equations with solutions. Some exact methods and transformations. Symbolic and numerical methods for solving nonlinear PDEs with Maple™, Mathematica®, and MATLAB®. Many new illustrative examples and tables. A large list of references consisting of over 1,300 sources. To accommodate different mathematical backgrounds, the authors avoid wherever possible the use of special terminology. They outline the methods in a simplified manner and arrange the material in increasing order of complexity.

Electromagnetic Radiation, Scattering, and Diffraction Discover a graduate-level text for students specializing in electromagnetic radiation, scattering, and diffraction for engineering applications. In *Electromagnetic Radiation, Scattering, and Diffraction*, distinguished authors Drs. Prabhakar H. Pathak and Robert J. Burkholder deliver a thorough exploration of the behavior of electromagnetic fields in radiation, scattering, and guided wave environments. The book tackles its subject from first principles and includes coverage of low and high frequencies. It provides physical interpretations of the electromagnetic wave phenomena along with their underlying mathematics. The authors emphasize fundamental principles and provide numerous examples to illustrate the concepts covered within. Students with a limited undergraduate electromagnetic background will rapidly and systematically advance their understanding of electromagnetic wave theory until they can complete useful and important graduate-level work on electromagnetic wave problems. *Electromagnetic Radiation, Scattering and Diffraction* also serves as a practical companion for students trying to simulate problems with commercial EM software and trying to better interpret their results. Readers will also benefit from the breadth and depth of topics covered, such as:

- Basic equations governing all electromagnetic (EM) phenomena at macroscopic scales are presented and solved systematically.
- Stationary and relativistic moving boundary conditions are developed.
- Waves in planar, cylindrical, and multilayered isotropic and anisotropic media are analyzed.
- EM theorems are introduced and applied to a wide variety of useful antenna problems.
- Modal techniques are presented for analyzing guided wave and periodic structures.
- Potential theory and Green's function methods are developed to treat interior and exterior radiation problems.
- Asymptotic High Frequency methods are developed for evaluating radiation integrals to extract far-field patterns.
- Edge and surface diffracted ray fields, as well as surface, leaky and lateral wave fields are obtained.
- Collective ray analysis for finite conformal antenna phased arrays is developed.
- EM beams are introduced and used to provide useful basis functions.
- Integral equations and their numerical solutions via the method of moments are developed.
- The fast multipole method is presented.
- Low frequency breakdown is studied.
- Characteristic modes are discussed.

Perfect for graduate students studying electromagnetic theory, *Electromagnetic Radiation, Scattering, and Diffraction* is an invaluable resource for professional electromagnetic engineers and

researchers working in this area.

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