

Journal Of Electromagnetic Analysis And Applications

Partial contents include: (1) Domain Decomposition Strategies for Solving the Maxwell Equations on Distributed Parallel Architectures; (2) Moment Method Surface Patch and Wire Grid Accuracy in the Computation of Near Fields; (3) Using the FDTD Method to Model the Reflection Coefficient of a Vivaldi Tapered Slot Antenna Fed Through a Planar Balun; (4) Finite-Difference Time-Domain Modeling of Light-Trapping in Solar Cells; (5) Modeling Eddy Currents in Unbounded Structures Using the Impedance Method; and (6) Verification of Software for Electromagnetic Field Analysis Using Models Proposed by Investigation Committees in IEE of Japan.

The demand for new and effective methods for the evaluation, maintenance and live-time testing of objects in fields as diverse as engineering, medicine and art, continues to grow. Electromagnetic non-destructive evaluation is a process by which an object can be assessed without permanent alteration by means of inducing electric currents or magnetic fields within the object and observing the electromagnetic response. This book presents selected papers from the 18th International Workshop on Electromagnetic Non-destructive Evaluation (ENDE), which was held in Bratislava, Slovak Republic, on June 25-28, 2013. The aim of the workshop was to provide an international forum for the discussion of the state-of-the-art and perspectives in the field from the view of science, technology and engineering. The book is divided into five main sections: advanced sensors; analytical and numerical modeling and biomedical applications; innovative industrial applications; new developments; and, solutions of inverse problems. Containing 40 peer-reviewed papers, it will be of interest to all those whose work involves electromagnetic non-destructive evaluation, whatever the discipline.

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This book brings together recent advances in tensor analysis and studies of its invariants such as twistors, spinors, kinematic tensors and others belonging to tensor algebras with extended structures, Lie algebras, Kac-Moody algebras, and enveloping algebras, among others. Chapters cover such topics as classical tensors, bilinear forms, tensors for exploring space-time, tensor applications in geometry and continuum media, and advanced topics in tensor analysis such as invariant theory, derived categories, hypercohomologies, k-modules, extensions of kinematic tensors, infinite dimensional operators, and more.

Advanced Modeling in Computational Electromagnetic Compatibility
John Wiley & Sons

Today, engineering problems are very complex, requiring powerful computer simulations to power them. For engineers, observable based parameterization as well as numerically computable forms with rapid convergent properties if in a series are essential. Complex Electromagnetic Problems and Numerical Simulation Approaches, along with its companion FTP site, will show you how to take on complex electromagnetic problems and solve them in an accurate and efficient manner. Organized into distinct parts, this comprehensive resource first introduces you the concepts, approaches, and numerical simulation techniques will be used throughout the book and then, in Part II, offers step by step guidance as to their practical, real-world applications. Self-contained chapters will enable you to find specific solutions to numerous problems. Filled with in-depth insight and expert advice.

Complex Electromagnetic Problems and Numerical Simulation Approaches: Describes ground wave propagation Examines antenna systems Deals with radar cross section (RCS) modeling Explores microstrip network design with FDTD and TLM techniques Discusses electromagnetic compatibility (EMC) and BEM modeling Presents radar simulation

Whether you're a professional electromagnetic engineer requiring a consolidated overview of the subject or an academic/student who

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wishes to use powerful simulators as a learning tool, Complex Electromagnetic Problems and Numerical Simulation Approaches with its focus on model development, model justification, and range of validity - is the right book for you.

With Applications in Antenna, Microwave, and Optical Engineering
Complex Electromagnetic Problems and Numerical Simulation Approaches

Circuit Oriented Electromagnetic Modeling Using the PEEC Techniques

VII Latin American Congress on Biomedical Engineering CLAIB 2016, Bucaramanga, Santander, Colombia, October 26th -28th, 2016

Fundamentals, Machine Learning, and the Internet of Things

This new resource covers the latest developments in computational electromagnetic methods, with emphasis on cutting-edge applications. This book is designed to extend existing literature to the latest development in computational electromagnetic methods, which are of interest to readers in both academic and industrial areas. The topics include advanced techniques in MoM, FEM and FDTD, spectral domain method, GPU and Phi hardware acceleration, metamaterials, frequency and time domain integral equations, and statistics methods in bio-electromagnetics.

An authoritative and comprehensive guide to managing energy conservation in infrastructures Energy Conservation in Residential, Commercial, and Industrial Facilities offers an essential guide to the business models and engineering design frameworks for the implementation of energy

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conservation in infrastructures. The presented models of both physical and technological systems can be applied to a wide range of structures such as homes, hotels, public facilities, industrial facilities, transportation, and water/energy supply systems. The authors—noted experts in the field—explore the key performance indicators that are used to evaluate energy conservation strategies and the energy supply scenarios as part of the design and operation of energy systems in infrastructures. The text is based on a systems approach that demonstrates the effective management of building energy knowledge and supports the simulation, evaluation, and optimization of several building energy conservation scenarios. In addition, the authors explore new methods of developing energy semantic network (ESN) superstructures, energy conservation optimization techniques, and risk-based life cycle assessments. This important text: Defines the most effective ways to model the infrastructure of physical and technological systems Includes information on the most widely used techniques in the validation and calibration of building energy simulation Offers a discussion of the sources, quantification, and reduction of uncertainty Presents a number of efficient energy conservation strategies in infrastructure systems, including HVAC, lighting, appliances, transportation, and industrial facilities

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Describes illustrative case studies to demonstrate the proposed energy conservation framework, practices, methods, engineering designs, control, and technologies Written for students studying energy conservation as well as engineers designing the next generation of buildings, Energy Conservation in Residential, Commercial, and Industrial Facilities offers a wide-ranging guide to the effective management of energy conservation in infrastructures.

This book consists of the proceedings of the International Conference on Detection and Classification of Underwater Targets which took place in Brest, France, in October 2012. This collection of academic papers represents the current state of the art of research and development in the areas of sensor technology, processing, modeling and automation for the purpose of detecting and classifying objects in the underwater environment, written by leading researchers in government, industry and academia. These articles should be of interest not only to those working on underwater target detection, but also to researchers in the related fields of remote sensing, robotic perception and medical imaging.

Electromagnetic materials can be widely found in daily life, especially in electronic devices. The high-frequency properties (permittivity or permeability) of these materials strongly depend on structure, composition, shape, and orientation.

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Therefore, this book intends to present readers with advances not only in materials science (including metamaterials), but also in measurements and novel functional applications that demand the special properties of electromagnetic materials. This book contains recent and important results on the deep study of the universe through one of the fields observable that will have a great impact in the next 100 years on space-time research and the creation of future technologies. It will appeal to mathematicians, natural scientists, cosmologists, theoretical physicians, particle physicians, electronics researchers and postgraduate students in mathematical physics dedicated to the study of the universe.

*Handbook of Research on Recent Developments in Intelligent Communication Application
Integral Equation Methods for
Electromagnetics*

*National Conference on Electrical Sciences
(NCES - 2021)*

*Numerical Analysis for Electromagnetic
Integral Equations*

*Approximate Boundary Conditions in
Electromagnetics*

Achieve optimal microwave system performance by mastering the principles and methods underlying today's powerful computational tools and commercial software in electromagnetics. This authoritative resource offers you clear and complete explanation of this essential electromagnetics knowledge, providing you with the analytical background you

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need to understand such key approaches as MoM (method of moments), FDTD (Finite Difference Time Domain) and FEM (Finite Element Method), and Green's functions. This comprehensive book includes all math necessary to master the material. Moreover, it features numerous solved problems that help ensure your understanding of key concepts throughout the book.

CONTENTS: Analysis of the Finite Element Radiation Model Cone for Antenna Modeling; Accuracy of the Finite Element Method with Second Order Absorbing Boundary Conditions for the Solution of Aperture Radiation Problems; The FEMAX Finite Element Package for Computing Three dimensional Electromagnetic Fields; A Moment Method Formulation for The Analysis of Wire Antennas Attached to Arbitrary Conducting Bodies Defined by Parametric Surfaces; A Posteriori Error Estimates for Two Dimensional Electromagnetic Field Computations: Boundary Elements and Finite Elements; Modelling of an Arbitrarily Oriented Mobile Telephone Handset in the Finite Difference Time Domain Field Computation Method; A Magnetic Field Iterative Technique for Improving High Frequency Prediction Methods; Modeling of Remote Field Eddy Current Transient Phenomena; and Letter From the Editor: Duncan Baker

This unique volume is the first book on integral equation-based methods that combines quantitative formulas for predicting numerical simulation accuracy together with rigorous error estimates and results for dozens of actual electromagnetics and wave propagation problems. You get the latest insights on accuracy-improving methods like regularization and error-increasing effects such as edge singularities and resonance, along with full details on how to determine mesh density, choice of basis functions, and other parameters needed to optimize any numerical simulation. Bridges the gap between electromagnetics and circuits by

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addressing electrometric modeling (EM) 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 radiate 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 solution 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.

An indispensable guide for engineers and data scientists in design, testing, operation, manufacturing, and maintenance A road map to the current challenges and available opportunities for the research and development of Prognostics and Health Management (PHM), this important work covers all areas of electronics and explains how to: assess methods for damage estimation of components and systems due to field loading conditions assess the cost and benefits of prognostic implementations develop novel methods for in situ monitoring of products and systems in

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actual life-cycle conditions enable condition-based (predictive) maintenance increase system availability through an extension of maintenance cycles and/or timely repair actions; obtain knowledge of load history for future design, qualification, and root cause analysis reduce the occurrence of no fault found (NFF) subtract life-cycle costs of equipment from reduction in inspection costs, downtime, and inventory Prognostics and Health Management of Electronics also explains how to understand statistical techniques and machine learning methods used for diagnostics and prognostics. Using this valuable resource, electrical engineers, data scientists, and design engineers will be able to fully grasp the synergy between IoT, machine learning, and risk assessment.

Volume 1: Spectral Representations in Temporally Dispersive Media

Nanoscience and Advancing Computational Methods in Chemistry: Research Progress

Advances in Computer and Computational Sciences

Theory and Computation of Electromagnetic Fields

Electromagnetic Materials and Devices

Wireless communications have become invaluable in the modern world. The market is going through a revolutionary transformation as new technologies and standards endeavor to keep up with demand for integrated and low-cost mobile and wireless devices. Due to their ubiquity, there is also a need for a simplification of the design of wireless systems and networks. The Handbook of Research on Advanced Trends in Microwave and Communication Engineering showcases the current trends and approaches in the design and analysis of reconfigurable microwave

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devices, antennas for wireless applications, and wireless communication technologies. Outlining both theoretical and experimental approaches, this publication brings to light the unique design issues of this emerging research, making it an ideal reference source for engineers, researchers, graduate students, and IT professionals.

The five-volume set may serve as a comprehensive reference on electromagnetic analysis and its applications at all frequencies, from static fields to optics and photonics. The material includes micro- and nanomagnetism, the new generation of electric machines, renewable energy, hybrid vehicles, low-noise motors; antennas and microwave devices, plasmonics, metamaterials, lasers, and more. Written at a level accessible to both graduate students and engineers,

Electromagnetic Analysis is a comprehensive reference, covering methods and applications at all frequencies (from statics to optical).

Each volume contains pedagogical/tutorial material of high archival value as well as chapters on state-of-the-art developments.

Exchange of information and innovative ideas are necessary to accelerate the development of technology. With advent of technology, intelligent and soft computing techniques came into existence with a wide scope of implementation in engineering sciences.

Keeping this ideology in preference, this book includes the insights that reflect the 'Advances in Computer and Computational

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Sciences' from upcoming researchers and leading academicians across the globe. It contains high-quality peer-reviewed papers of 'International Conference on Computer, Communication and Computational Sciences (ICCCS 2016), held during 12-13 August, 2016 in Ajmer, India. These papers are arranged in the form of chapters. The content of the book is divided into two volumes that cover variety of topics such as intelligent hardware and software design, advanced communications, power and energy optimization, intelligent techniques used in internet of things, intelligent image processing, advanced software engineering, evolutionary and soft computing, security and many more. This book helps the perspective readers' from computer industry and academia to derive the advances of next generation computer and communication technology and shape them into real life applications. In this book, a general frequency domain numerical method similar to the finite difference frequency domain (FDFD) technique is presented. The proposed method, called the multiresolution frequency domain (MRFD) technique, is based on orthogonal Battle-Lemarie and biorthogonal Cohen-Daubechies-Feauveau (CDF) wavelets. The objective of developing this new technique is to achieve a frequency domain scheme which exhibits improved computational efficiency figures compared to the traditional FDFD method: reduced memory and simulation time

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requirements while retaining numerical accuracy. The newly introduced MRFD scheme is successfully applied to the analysis of a number of electromagnetic problems, such as computation of resonance frequencies of one and three dimensional resonators, analysis of propagation characteristics of general guided wave structures, and electromagnetic scattering from two dimensional dielectric objects. The efficiency characteristics of MRFD techniques based on different wavelets are compared to each other and that of the FDFD method. Results indicate that the MRFD techniques provide substantial savings in terms of execution time and memory

requirements, compared to the traditional FDFD method. Table of Contents: Introduction / Basics of the Finite Difference Method and Multiresolution Analysis / Formulation of the Multiresolution Frequency Domain Schemes / Application of MRFD Formulation to Closed Space Structures / Application of MRFD Formulation to Open Space Structures / A Multiresolution Frequency Domain Formulation for Inhomogeneous Media / Conclusion

This text/reference is a detailed look at the development and use of integral equation methods for electromagnetic analysis, specifically for antennas and radar scattering. Developers and practitioners will appreciate the broad-based approach to understanding and utilizing integral equation methods and the unique coverage of historical developments that led to the current state-of-

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the-art. In contrast to existing books, Integral Equation Methods for Electromagnetics lays the groundwork in the initial chapters so students and basic users can solve simple problems and work their way up to the most advanced and current solutions.

Computational Methods in Geophysical Electromagnetics

Deterministic and Statistical Theories Prognostics and Health Management of Electronics

Proceedings of ICCCS 2016, Volume 1

Compendium On Electromagnetic Analysis - From Electrostatics To Photonics: Fundamentals And Applications For Physicists And Engineers (In 5 Volumes)

The budding field of nanotechnology offers enormous potential for advances in medical science, engineering, transportation, computers, and many other industries. As this growing field solidifies, these technological advances may soon become a reality. Nanoscience and Advancing Computational Methods in Chemistry: Research Progress provides innovative chapters covering the growth of educational, scientific, and industrial research activities among chemical engineers and provides a medium for mutual communication between international academia and the industry. This book publishes significant research reporting new methodologies and important applications in the fields of chemical informatics and

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discusses latest coverage of chemical databases and the development of new experimental methods.

Written by the leading experts in the field, this text provides systematic coverage of the theory, physics, functional designs, and engineering applications of advanced engineered electromagnetic surfaces. All the essential topics are included, from the fundamental theorems of surface electromagnetics, to analytical models, general sheet transmission conditions (GSTC), metasurface synthesis, and quasi-periodic analysis. A plethora of examples throughout illustrate the practical applications of surface electromagnetics, including gap waveguides, modulated metasurface antennas, transmit arrays, microwave imaging, cloaking, and orbital angular momentum (OAM) beam generation, allowing readers to develop their own surface electromagnetics-based devices and systems. Enabling a fully comprehensive understanding of surface electromagnetics, this is an invaluable text for researchers, practising engineers and students working in electromagnetics antennas, metasurfaces and optics.

An earthquake is a powerful surface acoustic wave (SAW) generated by a seismic event, such as a volcanic eruption or motion of the Earth's layers, that propagates on the Earth's surface. This book explains the design of earthquake resistant structures using SAW techniques that offer a variety of experimental setups and theoretical models. Designs of protecting systems able

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to dissipate or deflect SSW energy built around buildings or towns located in earthquake regions set this book apart from other seismology publications. This volume presents the proceedings of the CLAIB 2016, held in Bucaramanga, Santander, Colombia, 26, 27 & 28 October 2016. The proceedings, presented by the Regional Council of Biomedical Engineering for Latin America (CORAL), offer research findings, experiences and activities between institutions and universities to develop Bioengineering, Biomedical Engineering and related sciences. The conferences of the American Congress of Biomedical Engineering are sponsored by the International Federation for Medical and Biological Engineering (IFMBE), Society for Engineering in Biology and Medicine (EMBS) and the Pan American Health Organization (PAHO), among other organizations and international agencies to bring together scientists, academics and biomedical engineers in Latin America and other continents in an environment conducive to exchange and professional growth.

This volume contains the proceedings of the first ICASE/LaRC Work shop on Computational Electromagnetics and Its Applications conducted by the Institute for Computer Applications in Science and Engineering and NASA Langley Research Center. We had several goals in mind when we decided, jointly with the Electromagnetics Research Branch, to organize this workshop on Computa tional

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Electromagnetics (CEM). Among our goals were a desire to obtain an overview of the current state of CEM, covering both algorithms and applications and their effect on NASA's activities in this area. In addition, we wanted to provide an attractive setting for computational scientists with expertise in other fields, especially computational fluid dynamics (CFD), to observe the algorithms and tools of CEM at work. Our expectation was that scientists from both fields would discover mutually beneficial interconnections and relationships. Another goal was to learn of progress in solution algorithms for electromagnetic optimization and design problems; such problems make extensive use of field solvers and computational efficiency is at a premium. To achieve these goals we assembled the renowned group of speakers from academia and industry whose talks are contained in this volume. The papers are printed in the same order in which the talks were presented at the meeting. The first paper is an overview of work currently being performed in the Electromagnetic Research Branch at the Langley Research Center.

Computational Electromagnetics and Its Applications
Electromagnetic and Optical Pulse Propagation
Surface Electromagnetics

Energy Conservation in Residential, Commercial, and Industrial Facilities

Applied Computational Electromagnetics Society
Journal. Volume 11, Number 2

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Recent Topics in Electromagnetic Compatibility discusses several topics in electromagnetic compatibility (EMC) and electromagnetic interference (EMI), including measurements, shielding, emission, interference, biomedical devices, and numerical modeling. Over five sections, chapters address the electromagnetic spectrum of corona discharge, life cycle assessment of flexible electromagnetic shields, EMC requirements for implantable medical devices, analysis and design of absorbers for EMC applications, artificial surfaces, and media for EMC and EMI shielding, and much more.

Quantitative Magnetic Resonance Imaging is a 'go-to' reference for methods and applications of quantitative magnetic resonance imaging, with specific sections on Relaxometry, Perfusion, and Diffusion. Each section will start with an explanation of the basic techniques for mapping the tissue property in question, including a description of the challenges that arise when using these basic approaches. For properties which can be measured in multiple ways, each of these basic methods will be described in separate chapters. Following the basics, a chapter in each section presents more advanced and recently proposed techniques for quantitative tissue property mapping, with a concluding chapter on clinical applications. The reader will learn: The basic

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physics behind tissue property mapping How to implement basic pulse sequences for the quantitative measurement of tissue properties The strengths and limitations to the basic and more rapid methods for mapping the magnetic relaxation properties T1, T2, and T2* The pros and cons for different approaches to mapping perfusion The methods of Diffusion-weighted imaging and how this approach can be used to generate diffusion tensor maps and more complex representations of diffusion How flow, magneto-electric tissue property, fat fraction, exchange, elastography, and temperature mapping are performed How fast imaging approaches including parallel imaging, compressed sensing, and Magnetic Resonance Fingerprinting can be used to accelerate or improve tissue property mapping schemes How tissue property mapping is used clinically in different organs Structured to cater for MRI researchers and graduate students with a wide variety of backgrounds Explains basic methods for quantitatively measuring tissue properties with MRI - including T1, T2, perfusion, diffusion, fat and iron fraction, elastography, flow, susceptibility - enabling the implementation of pulse sequences to perform measurements Shows the limitations of the techniques and explains the challenges to the clinical adoption of these traditional methods, presenting the latest research in rapid quantitative

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imaging which has the possibility to tackle these challenges Each section contains a chapter explaining the basics of novel ideas for quantitative mapping, such as compressed sensing and Magnetic Resonance Fingerprinting-based approaches

A thorough and rigorous analysis of electromagnetic fields in cavities This book offers a comprehensive analysis of electromagnetic fields in cavities of general shapes and properties. Part One covers classical deterministic methods to conclude resonant frequencies, modal fields, and cavity losses; quality factor; mode bandwidth; and the excitation of cavity fields from arbitrary current distributions for metal-wall cavities of simple shape. Part Two covers modern statistical methods to analyze electrically large cavities of complex shapes and properties. Electromagnetic Fields in Cavities combines rigorous solutions to Maxwell's equations with conservation of energy to solve for the statistics of many quantities of interest: penetration into cavities (and shielding effectiveness), field strengths far from and close to cavity walls, and power received by antennas within cavities. It includes all modes and shows you how to utilize fairly simple statistical formulae to apply to your particular problem, whether it's interference calculations, electromagnetic compatibility testing in reverberation chambers,

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measurement of shielding materials using multiple cavities, or efficiency of test antennas.

Electromagnetic Fields in Cavities is a valuable resource for researchers, engineers, professors, and graduate students in electrical engineering. Magnetic oxides have highly interesting applications in the fields of permanent magnets, microwave devices, magnetic refrigeration, sensors, catalysis, and the health sector. This book focuses on the synthesis, characterization, and applications of various perovskites, garnets, manganites, carbon-based metal oxide nanocomposites, nanoferrites, and graphene-metal oxide nanocomposites. Keywords: Magnetic Oxides, Permanent Magnets, Microwave Devices, Magnetic Refrigeration, Sensors, Catalysis, Perovskites, Nanoferrites, Manganites, Rare Earth Iron Garnet, Graphene-Metal Oxide Nanocomposites, Carbon Nanomaterials, Mesoporous Materials, Nanocatalysts, Multifunctional Ferrites, Magnetocaloric Effect, Biosynthesis, Photo Catalysis, Antibacterial Activity, High Density Recording Media.

This book is a self-contained, programming-oriented and learner-centered book on finite element method (FEM), with special emphasis given to developing MATLAB® programs for numerical modeling of electromagnetic boundary value problems. It provides a deep understanding

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and intuition of FEM programming by means of step-by-step MATLAB® programs with detailed descriptions, and eventually enabling the readers to modify, adapt and apply the provided programs and formulations to develop FEM codes for similar problems through various exercises. It starts with simple one-dimensional static and time-harmonic problems and extends the developed theory to more complex two- or three-dimensional problems. It supplies sufficient theoretical background on the topic, and it thoroughly covers all phases (pre-processing, main body and post-processing) in FEM. FEM formulations are obtained for boundary value problems governed by a partial differential equation that is expressed in terms of a generic unknown function, and then, these formulations are specialized to various electromagnetic applications together with a post-processing phase. Since the method is mostly described in a general context, readers from other disciplines can also use this book and easily adapt the provided codes to their engineering problems. After forming a solid background on the fundamentals of FEM by means of canonical problems, readers are guided to more advanced applications of FEM in electromagnetics through a survey chapter at the end of the book. Offers a self-contained and easy-to-understand introduction to the theory and programming of finite element method. Covers various applications

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in the field of static and time-harmonic electromagnetics. Includes one-, two- and three-dimensional finite element codes in MATLAB®. Enables readers to develop finite element programming skills through various MATLAB® codes and exercises. Promotes self-directed learning skills and provides an effective instruction tool.

Advanced Modeling in Computational Electromagnetic Compatibility
Electromagnetic Analysis and Design in Magnetic Resonance Imaging

Handbook of Research on Advanced Trends in Microwave and Communication Engineering
Electromagnetic Nondestructive Evaluation (XVII)
Proceedings of the Tenth International Symposium on Applied Electromagnetic and Mechanics

This text combines the fundamentals of electromagnetics with numerical modeling to tackle a broad range of current electromagnetic compatibility (EMC) problems, including problems with lightning, transmission lines, and grounding systems. It sets forth a solid foundation in the basics before advancing to specialized topics, and allows readers to develop their own EMC computational models for applications in both research and industry.

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This volume presents a detailed, rigorous treatment of the fundamental theory of electromagnetic pulse propagation in causally dispersive media that is applicable to dielectric, conducting, and semiconducting media. Asymptotic methods of approximation based upon saddle point methods are presented in detail.

*This unique book presents simple, easy-to-use, but effective short codes as well as virtual tools that can be used by electrical, electronic, communication, and computer engineers in a broad range of electrical engineering problems. Electromagnetic modeling is essential to the design and modeling of antenna, radar, satellite, medical imaging, and other applications. In this book, author Levent Sevgi explains techniques for solving real-time complex physical problems using MATLAB-based short scripts and comprehensive virtual tools. Unique in coverage and tutorial approach, *Electromagnetic Modeling and Simulation* covers fundamental analytical and numerical models that are widely used in teaching, research,*

and engineering designs—including mode and ray summation approaches with the canonical 2D nonpenetrable parallel plate waveguide as well as FDTD, MoM, and SSPE scripts. The book also establishes an intelligent balance among the essentials of EMMODSIM: The Problem (the physics), The Theory and Models (mathematical background and analytical solutions), and The Simulations (code developing plus validation, verification, and calibration). Classroom tested in graduate-level and short courses, *Electromagnetic Modeling and Simulation: Clarifies concepts through numerous worked problems and quizzes provided throughout the book* Features valuable MATLAB-based, user-friendly, effective engineering and research virtual design tools Includes sample scenarios and video clips recorded during characteristic simulations that visually impact learning—available on wiley.com Provides readers with their first steps in EM MODSIM as well as tools for medium and high-level code developers and users *Electromagnetic Modeling and*

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Simulation thoroughly covers the physics, mathematical background, analytical solutions, and code development of electromagnetic modeling, making it an ideal resource for electrical engineers and researchers.

Reviews the fundamental concepts behind the theory and computation of electromagnetic fields The book is divided in two parts. The first part covers both fundamental theories (such as vector analysis, Maxwell's equations, boundary condition, and transmission line theory) and advanced topics (such as wave transformation, addition theorems, and fields in layered media) in order to benefit students at all levels. The second part of the book covers the major computational methods for numerical analysis of electromagnetic fields for engineering applications. These methods include the three fundamental approaches for numerical analysis of electromagnetic fields: the finite difference method (the finite difference time-domain method in particular), the finite element method,

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and the integral equation-based moment method. The second part also examines fast algorithms for solving integral equations and hybrid techniques that combine different numerical methods to seek more efficient solutions of complicated electromagnetic problems.

Theory and Computation of Electromagnetic Fields, Second Edition: Provides the foundation necessary for graduate students to learn and understand more advanced topics

Discusses electromagnetic analysis in rectangular, cylindrical and spherical coordinates Covers computational

electromagnetics in both frequency and time domains Includes new and updated homework problems and examples *Theory and Computation of Electromagnetic*

Fields, Second Edition is written for advanced undergraduate and graduate level electrical engineering students.

This book can also be used as a reference for professional engineers interested in learning about analysis and computation skills.

This publication covers topics in the area of applied electromagnetics and mechanics. Since starting in Japan in

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1988, the ISEM has become a well-known international forum on applied electromagnetics.

*Quantitative Magnetic Resonance Imaging
Deep Study of the Universe through
Torsion*

*Recent Topics in Electromagnetic
Compatibility*

*MATLAB-based Finite Element Programming
in Electromagnetic Modeling*

The communication field is evolving rapidly in order to keep up with society's demands. As such, it becomes imperative to research and report recent advancements in computational intelligence as it applies to communication networks. The Handbook of Research on Recent Developments in Intelligent Communication Application is a pivotal reference source for the latest developments on emerging data communication applications. Featuring extensive coverage across a range of relevant perspectives and topics, such as satellite communication, cognitive radio networks, and wireless sensor networks, this book is ideally designed for engineers, professionals, practitioners, upper-level students, and academics seeking current information on emerging communication networking trends.

The rise of disruptive technologies in various departments of engineering is set to dominate the industries in the upcoming years. Focus is being emerged to provide the latest developments of the cutting edge technologies that have immense applications in various fields of engineering sciences.

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There is an immense need to bridge the gap between the academia and industries that helps in overall development of the society. The conference aims to bring researchers, academicians, together to participate and showcase the results of their current research findings in the broad fields of Electrical Sciences.

This book presents a comprehensive treatment of electromagnetic analysis and design of three critical devices for an MRI system - the magnet, gradient coils, and radiofrequency (RF) coils. *Electromagnetic Analysis and Design in Magnetic Resonance Imaging* is unique in its detailed examination of the analysis and design of the hardware for an MRI system. It takes an engineering perspective to serve the many scientists and engineers in this rapidly expanding field. Chapters present: an introduction to MRI basic concepts of electromagnetics, including Helmholtz and Maxwell coils, inductance calculation, and magnetic fields produced by special cylindrical and spherical surface currents principles for the analysis and design of gradient coils, including discrete wires and the target field method analysis of RF coils based on the equivalent lumped-circuit model as well as an analysis based on the integral equation formulation survey of special purpose RF coils analytical and numerical methods for the analysis of electromagnetic fields in biological objects With the continued, active development of MRI instrumentation, *Electromagnetic Analysis and Design in Magnetic Resonance Imaging* presents an excellent, logically organized text - an indispensable resource for engineers, physicists, and graduate students working in the field of MRI. Commonplace use of non-metallic materials and composites in vehicles and other environments has led to a need to compute

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scattering and other electromagnetic phenomena in their presence. This book provides the first comprehensive treatment of a variety of approximate boundary conditions in electromagnetics. The genesis and properties of impedance, resistive sheet, conductive sheet, generalised and absorbing boundary conditions are discussed. Applications to diffraction by numerous canonical geometries and impedance structures are presented. Accuracy and uniqueness issues are addressed and high frequency techniques such as physical and geometrical theory of diffraction are introduced. Many of the results presented are previously unpublished.

The finite-difference time-domain (FDTD) method has revolutionized antenna design and electromagnetics engineering. This book raises the FDTD method to the next level by empowering it with the vast capabilities of parallel computing. It shows engineers how to exploit the natural parallel properties of FDTD to improve the existing FDTD method and to efficiently solve more complex and large problem sets. Professionals learn how to apply open source software to develop parallel software and hardware to run FDTD in parallel for their projects. The book features hands-on examples that illustrate the

Parallel Finite-difference Time-domain Method

Seismic Resistant Design and Technology

Magnetic Oxides and Composites II

Electromagnetic Modeling and Simulation

Multiresolution Frequency Domain Technique for
Electromagnetics

This monograph provides a framework for students and practitioners who are working on the solution of electromagnetic imaging in geophysics. Bridging the

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gap between theory and practical applied material (for example, inverse and forward problems), it provides a simple explanation of finite volume discretization, basic concepts in solving inverse problems through optimization, a summary of applied electromagnetics methods, and MATLAB??code for efficient computation.

Electromagnetic Fields in Cavities

Research Progress

Advanced Computational Electromagnetic Methods

Analytical and Computational Methods in

Electromagnetics

Applied Computational Electromagnetics Society

Journal, Vol. 12