Rectangular Waveguide Fdtd Matlab Code

Despite the dramatic growth in the availability of powerful
computer resources, the EM community lacks a
comprehensive text on the computational techniques used to
solve EM problems. The first edition of Numerical Techniques
in Electromagnetics filled that gap and became the reference
of choice for thousands of engineers, researchers, and students.
This third edition of the bestselling text reflects the continuing
increase in awareness and use of numerical techniques and
incorporates advances and refinements made in recent years.
Most notable among these are the improvements made to the
standard algorithm for the finite-difference time-domain
(FDTD) method and treatment of absorbing boundary
conditions in FDTD, finite element, and transmission-line-
matrix methods. The author also has added a chapter on the
method of lines. Numerical Techniques in Electromagnetics
with MATLAB®, Third Edition continues to teach readers
how to pose, numerically analyze, and solve EM problems, to
give them the ability to expand their problem-solving skills
using a variety of methods, and to prepare them for research in
electromagnetism. Now the Third Edition goes even further
toward providing a comprehensive resource that addresses all
of the most useful computation methods for EM problems and
includes MATLAB code instead of FORTRAN.
Balanis' second edition of Advanced Engineering
Electromagnetics – a global best-seller for over 20 years –
covers the advanced knowledge engineers involved in
electromagnetic need to know, particularly as the topic relates

to the fast-moving, continually evolving, and rapidly expanding field of wireless communications. The immense interest in wireless communications and the expected increase in wireless communications systems projects (antenna, microwave and wireless communication) points to an increase in the number of engineers needed to specialize in this field. In addition, the Instructor Book Companion Site contains a rich collection of multimedia resources for use with this text. Resources include: Ready-made lecture notes in Power Point format for all the chapters. Forty-nine MATLAB® programs to compute, plot and animate some of the wave phenomena Nearly 600 end-of-chapter problems, that's an average of 40 problems per chapter (200 new problems; 50% more than in the first edition) A thoroughly updated Solutions Manual 2500 slides for Instructors are included.

"Integrates principles of electromagnetics, dielectrics, heat and moisture transfer, packaging, solid mechanics, fluid flow, food chemistry, and microbiology to provide a comprehensive overview of microwave processing in a single accessible source."

This book constitutes the full papers and short monographs developed on the base of the refereed proceedings of the International Conference on Information Technologies: Information and Communication Technologies for Research and Industry (ICIT-2019), held in Saratov, Russia in February 2019. The book brings accepted papers which present new approaches and methods of solving problems in the sphere of control engineering and decision making for the various fields of studies: industry and research, ontology-based data simulation, smart city technologies, theory and use of digital signal processing, cognitive systems, robotics, cybernetics,

automation control theory, image recognition technologies, and computer vision. Particular emphasis is laid on modern trends, new approaches, algorithms and methods in selected fields of interest. The presented papers were accepted after careful reviews made by at least three independent reviewers in a double-blind way. The acceptance level was about 60%. The chapters are organized thematically in several areas within the following tracks: • Models, Methods & Approaches in Decision Making Systems • Mathematical Modelling for Industry & Research • Smart City Technologies The conference is focused on development and globalization of information and communication technologies (ICT), methods of control engineering and decision making along with innovations and networking, ICT for sustainable development and technological change, and global challenges. Moreover, the ICIT-2019 served as a discussion area for the actual above-mentioned topics. The editors believe that the readers will find the proceedings interesting and useful for their own research work.

Foundations of Antenna Engineering: A Unified Approach for Line-of-Sight and Multipath

Newnes Circuits Manual Series

Select Proceedings of ICSC 2018

Numerical Techniques in Electromagnetics, Second Edition

The Finite-Difference Time-Domain Method for Electromagnetics with MATLAB® Simulations

Advanced Electromagnetic Computation with MATLAB® discusses commercial electromagnetic software, widely used in the industry. Algorithms of Finite Differences, Moment method, Finite Element method and Finite Difference Time Domain method

are illustrated. Hand-computed simple examples and MATLAB-coded examples are used to explain the concepts behind the algorithms. Case studies of practical examples from transmission lines, waveguides, and electrostatic problems are given so students are able to develop the code and solve the problems. Two new chapters including advanced methods based on perturbation techniques and three dimensional finite element examples from radiation scattering are included.
This text is intended to provide an in-depth, self-contained, treatment of optical waveguide theory. We have attempted to emphasize the underlying physical processes, stressing conceptual aspects, and have developed the mathematical analysis to parallel the physical intuition. We also provide comprehensive supplementary sections both to augment any deficiencies in mathematical background and to provide a self-consistent and rigorous mathematical approach. To assist in. understanding, each chapter con centrates principally on a single idea and is therefore comparatively short. Furthermore, over 150 problems with complete solutions are given to demonstrate applications of the theory. Accordingly, through simplicity of approach and numerous examples, this book is accessible to undergraduates. Many fundamental topics are presented here for the first time, but, more importantly, the material is brought together to give a unified treatment of basic ideas using the simplest approach possible. To achieve such a goal required a maturation of the subject, and thus the text was intentionally developed over a protracted period of the last 10 years.
As the availability of powerful computer resources

has grown over the last three decades, the art of computation of electromagnetic (EM) problems has also grown - exponentially. Despite this dramatic growth, however, the EM community lacked a comprehensive text on the computational techniques used to solve EM problems. The first edition of Numerical Techniques in Electromagnetics filled that gap and became the reference of choice for thousands of engineers, researchers, and students. The Second Edition of this bestselling text reflects the continuing increase in awareness and use of numerical techniques and incorporates advances and refinements made in recent years. Most notable among these are the improvements made to the standard algorithm for the finite difference time domain (FDTD) method and treatment of absorbing boundary conditions in FDTD, finite element, and transmission-line-matrix methods. The author also added a chapter on the method of lines. Numerical Techniques in Electromagnetics continues to teach readers how to pose, numerically analyze, and solve EM problems, give them the ability to expand their problem-solving skills using a variety of methods, and prepare them for research in electromagnetism. Now the Second Edition goes even further toward providing a comprehensive resource that addresses all of the most useful computation methods for EM problems.

Readily available commercial software enables engineers and students to perform routine calculations and design without necessarily having a sufficient conceptual understanding of the anticipated solution. The software is so user-friendly that it usually produces a beautiful colored

visualization of that solution, often camouflaging the fact that t
Advances in FDTD Computational Electrodynamics
Principles and Applications
Numerical Sound Synthesis
Newsletter

This book constitutes the thoroughly refereed proceedings of the Eleventh International Symposium on Natural Language Processing (SNLP-2016), held in Phranakhon Si Ayutthaya, Thailand on February 10–12, 2016. The SNLP promotes research in natural language processing and related fields, and provides a unique opportunity for researchers, professionals and practitioners to discuss various current and advanced issues of interest in NLP. The 2016 symposium was expanded to include the First Workshop in Intelligent Informatics and Smart Technology. Of the 66 high-quality papers accepted, this book presents twelve from the Symposium on Natural Language Processing track and ten from the Workshop in Intelligent Informatics and Smart Technology track (SSAI: Special Session on Artificial Intelligence).
Diode, Transistor and FET Circuits Manual is a handbook of circuits based on discrete semiconductor components such as diodes, transistors, and FETS. The book also includes diagrams and practical circuits. The book describes basic and special diode characteristics, heat wave-rectifier circuits, transformers, filter capacitors, and rectifier ratings. The text also presents practical applications of associated devices, for example, zeners, varicaps, photodiodes, or LEDs, as well as it describes bipolar transistor characteristics. The transistor can be used in three basic amplifier configurations, such as common-collector, common-emitter, or common-base. Oscillators and multivibrators use transistors as linear amplifying elements or as digital switching elements, respectively. In other practical applications, bipolar transistors are used in audio pre-amp, tone control, and power amplifier

applications. For example, the book illustrates the ideal form and location of the volume control where it is fully d.c-isolated from the pre-amplifier's output. The book cites other applications of transistor circuits in a noise limiter, in astable multivibrators, in L-C oscillators, and in lie detectors. This book is suitable for radio, television, and electronics technicians, design and application engineers, and students in electronics or radio communications. This book is a collection of selected peer-reviewed papers presented at the International Conference on Signal Processing and Communication (ICSC 2018). It covers current research and developments in the fields of communications, signal processing, VLSI circuits and systems, and embedded systems. The book offers in-depth discussions and analyses of latest problems across different sub-fields of signal processing and communications. The contents of this book will prove to be useful for students, researchers, and professionals working in electronics and electrical engineering, as well as other allied fields. Written by a leading expert in the field, this practical new resource presents the fundamentals of electromagnetics and antenna technology. This book covers the design, electromagnetic simulation, fabrication, and measurements for various types of antennas, including impedance matching techniques and beamforming for ultrawideband dipoles, monopoles, loops, vector sensors for direction finding, HF curtain arrays, 3D printed nonplanar patch antenna arrays, waveguides for portable radar, reflector antennas, and other antennas. It explores the essentials of phased array antennas and includes detailed derivations of important field equations, and a detailed formulation of the method of moments. This resource exhibits essential derivations of equations, providing readers with a strong foundation of the underpinnings of electromagnetics and antennas. It includes a complete chapter on the details of antenna and electromagnetic test and measurement. This book explores details on 3D printed non-planar circular patch array antenna technology and the design and

analysis of a planar array-fed axisymmetric gregorian reflector. The lumped-element impedance matched antennas are examined and include a look at an analytic impedance matching solution with a parallel LC network. This book provides key insight into many aspects of antenna technology that have broad applications in radar and communications.

Diode, Transistor & Fet Circuits Manual

Electromagnetic Modeling and Simulation

Numerical Techniques in Electromagnetics with MATLAB, Third Edition

ASC MSRC Wright Cycles Journal Fall 2004

Photonics and Nanotechnology

SRL suggestion. Making sense of Asynchronous Transfer Mode (ATM) can be difficult for students and engineers, but this book keeps it relativeley simple.

This book introduces the powerful Finite-Difference Time-Domain method to students and interested researchers and readers. An effective introduction is accomplished using a step-by-step process that builds competence and confidence in developing complete working codes for the design and analysis of various antennas and microwave devices. This book will serve graduate students, researchers, and those in industry and government who are using other electromagnetics tools and methods for the sake of performing independent numerical confirmation. No previous experience with finite-difference methods is assumed of readers.

Master powerful new modeling tools that let you quantify and represent metamaterial properties with never-before accuracy. This

first-of-its-kind book brings you up to speed
on breakthrough finite-difference time-domain
techniques for modeling metamaterial
characteristics and behaviors in
electromagnetic systems. This practical
resource comes complete with sample FDTD
scripts to help you pave the way to new
metamaterial applications and advances in
antenna, microwave, and optics engineering.
You get in-depth coverage of state-of-the-art
FDTD modeling techniques and applications for
electromagnetic bandgap (EBG) structures,
left-handed metamaterials (LHMs), wire
medium, metamaterials for optics, and other
practical metamaterials. You find steps for
computing dispersion diagrams, dealing with
material dispersion properties, and verifying
the left-handedness. Moreover, this
comprehensive volume offers guidance for
handling the unique properties possessed by
metamaterials, including how to define
material parameters, characterize the
interface of metamaterial slabs, and quantify
their spatial as well as frequency dispersion
characteristics. The book also presents
conformal and dispersive FDTD modeling of
electromagnetic cloaks, perfect lens, and
plasmonic waveguides, as well as other novel
antenna, microwave, and optical applications.
Over 190 illustrations support key topics
throughout the book.
Simulation is integral to the successful
design of modern radar systems, and there is
arguably no better software for this purpose

than MATLAB. But software and the ability to use it does not guarantee success. One must also: Understand radar operations and design philosophy Know how to select the radar parameters to meet the design req
The 1999 IEEE Region 10 Conference, "Multimedia Technology for Asia-Pacific Information Infrastructure", Sept. 15-17, 1999, The Silla Cheju, Cheju Island, Korea
16th IAEA Technical Meeting on Research Using Small Fusion Devices and XI Latin American Workshop on Plasma Physics
Electromagnetics and Antenna Technology
Complex Electromagnetic Problems and Numerical Simulation Approaches
Recent Research in Control Engineering and Decision Making

This is the first textbook that contains a holistic treatment of antennas both for traditional antennas mounted on masts (Line-of-Sight antenna systems) and for small antennas used on modern wireless devices such as smart phones being subject to signal variations (fading) due to multipath propagation. The focus is on characterization, as well as describing classical antennas by modern complex vector theory - thereby linking together many disciplines such as electromagnetic theory, classical antenna theory, wave propagation, and antenna system performance. Overall, this book represents a rethinking of the way basic antenna theory is presented. The book contains many references to important old and new papers and books on the analysis and design of the most useful antenna types, for the most interested readers. This book presents the theory of electromagnetic

(EM) waves for upper undergraduate, graduate and PhD-level students in engineering. It focuses on physics and microwave theory based on Maxwell's equations and the boundary conditions important for studying the operation of waveguides and resonators in a wide frequency range, namely, from approx. 10**9 to 10**16 hertz. The author also highlights various current topics in EM field theory, such as plasmonic (comprising a noble metal) waveguides and analyses of attenuations by filled waveguide dielectrics or semiconductors and also by conducting waveguide walls. Featuring a wide variety of illustrations, the book presents the calculated and schematic distributions of EM fields and currents in waveguides and resonators. Further, test questions are presented at the end of each chapter.

Today, engineering problems are very complex, requiring powerful computer simulations to power them. For engineers, observable-based parameterization as well as numerically computable formsâ??with rapid convergent properties if in a seriesâ??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 two distinct parts, this comprehensive resource first introduces you to the concepts, approaches, and numerical simulation techniques that 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 bio-electromagnetics (BEM) modeling Presents radar simulation Whether you're a professional electromagnetic engineer requiring a consolidated overview of the subject or an academic/student who 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.

Numerical Techniques in Electromagnetics with MATLABCRC Press

MATLAB Simulations for Radar Systems Design Numerical Techniques in Electromagnetics with MATLAB

Advanced Engineering Electromagnetics

Proceedings

Plasma and Fusion Science

This unique book presents simple, easy-to-use, but effectiveshort codes as well as virtual tools that can be used byelectrical, electronic, communication, and computer engineers in abroad range of electrical engineering problems Electromagnetic modeling is essential to the design and modelingof antenna, radar, satellite, medical imaging, and otherapplications. In this book, author Levent Sevgi explains techniquesfor solving

real-time complex physical problems using MATLAB-basedshort scripts and comprehensive virtual tools. Unique in coverage and tutorial approach, ElectromagneticModeling and Simulation covers fundamental analytical andnumerical models that are widely used in teaching, research, andengineering designs—including mode and ray summationapproaches with the canonical 2D nonpenetrable parallel platewaveguide as well as FDTD, MoM, and SSPE scripts. The book alsoestablishes an intelligent balance among the essentials of EMMODSIM: The Problem (the physics), The Theory and Models(mathematical background and analytical solutions), and TheSimulations (code developing plus validation, verification, andcalibration). Classroom tested in graduate-level and short courses,Electromagnetic Modeling and Simulation: Clarifies concepts through numerous worked problems and quizzesprovided throughout the book Features valuable MATLAB-based, user-friendly, effectiveengineering and research virtual design tools Includes sample scenarios and video clips recorded duringcharacteristic simulations that visually impactlearning—available on wiley.com Provides readers with their first steps in EM MODSIM as well astools for medium and high-level code developers and users Electromagnetic Modeling and Simulation thoroughly coversthe physics, mathematical background, analytical solutions, andcode development of electromagnetic modeling, making it an idealresource for electrical

engineers and researchers.

The deep interconnection between micro/nanooptical components and related fabrication technologies—and the constant changes in this ever-evolving field—means that successful design depends on the engineer's ability to accommodate cutting-edge theoretical developments in fabrication techniques and experimental realization. Documenting the state of the art in fabrication processes, Microoptics and Nanooptics Fabrication provides an up-to-date synopsis of recent breakthroughs in micro- and nanooptics that improve key developmental processes. This text elucidates the precise and miniaturized scale of today's fabrication methods and their importance in creating new optical components to access the spectrum of physical optics. It details successful fabrication techniques and their direct effect on the intended performance of micro- and nanooptical components. The contributors explore the constraints related to material selection, component lateral extent, minimum feature size, and other issues that cause fabrication techniques to lag behind corresponding theory in the development process. Written with the professional optical engineer in mind, this book omits the already well-published broader processing fundamentals. Instead it focuses on key tricks of the trade helpful in reformulating processes to achieve necessary optical targets, improve process fidelity, and reduce production costs. The contributing authors represent the vanguard in micro-optical fabrication. The result of their combined efforts, this searing analysis of

emerging fabrication technologies will continue to fuel the expansion of optics components, from the microwave to the infrared through the visible regime.

This hands-on introduction to silicon photonics engineering equips students with everything they need to begin creating foundry-ready designs.

Describes most popular computational methods used to solve problems in electromagnetics Matlab code is included throughout, so that the reader can implement the various techniques discussed Exercises included

Microoptics and Nanooptics Fabrication

International Aerospace Abstracts

Finite Difference Schemes and Simulation in Musical Acoustics

FDTD Modeling of Metamaterials: Theory and Applications

Selected Revised Papers from the Eleventh International Symposium on Natural Language Processing (SNLP-2016) and the First Workshop in Intelligent Informatics and Smart Technology, 10-12 February 2016, Phranakhon, Si Ayutthaya, Thailand

The goal of this book is to discuss fundamentals of electromagnetic wave propagation, especially radiowave propagation, groundwave propagation, surface wave propagation, maritime communication, radar applications in terms of parabolic equation modeling and simulation approaches This is the first book on the guided wave propagation model in nearly two decades. This book will cover several new applications. The book also introduces several simple

and sophisticated MATLAB scripts as well as virtual electromagnetic tools for several well-known electromagnetic propagation problems.
A thorough and insightful introduction to using genetic algorithms to optimize electromagnetic systems Genetic Algorithms in Electromagnetics focuses on optimizing the objective function when a computer algorithm, analytical model, or experimental result describes the performance of an electromagnetic system. It offers expert guidance to optimizing electromagnetic systems using genetic algorithms (GA), which have proven to be tenacious in finding optimal results where traditional techniques fail. Genetic Algorithms in Electromagnetics begins with an introduction to optimization and several commonly used numerical optimization routines, and goes on to feature: Introductions to GA in both binary and continuous variable forms, complete with examples of MATLAB(r) commands Two step-by-step examples of optimizing antenna arrays as well as a comprehensive overview of applications of GA to antenna array design problems Coverage of GA as an adaptive algorithm, including adaptive and smart arrays as well as adaptive reflectors and crossed dipoles Explanations of the optimization of several different wire antennas, starting with the famous "crooked monopole" How to optimize horn, reflector, and microstrip patch antennas, which require significantly more computing power than wire antennas Coverage of GA optimization of scattering, including scattering from frequency selective surfaces and electromagnetic band gap materials Ideas on operator and parameter selection for a GA

Detailed explanations of particle swarm optimization and multiple objective optimization An appendix of MATLAB code for experimentation

A comprehensive manual on the efficient modeling and analysis of photonic devices through building numerical codes, this book provides graduate students and researchers with the theoretical background and MATLAB programs necessary for them to start their own numerical experiments. Beginning by summarizing topics in optics and electromagnetism, the book discusses optical planar waveguides, linear optical fiber, the propagation of linear pulses, laser diodes, optical amplifiers, optical receivers, finite-difference time-domain method, beam propagation method and some wavelength division devices, solitons, solar cells and metamaterials. Assuming only a basic knowledge of physics and numerical methods, the book is ideal for engineers, physicists and practising scientists. It concentrates on the operating principles of optical devices, as well as the models and numerical methods used to describe them.

Mexico City, Mexico, 5 - 9 December 2005
Introduction to ATM Design and Performance
Advances in Signal Processing and Communication
Digital Signal Processing Applications
With Applications Analysis Software
Advanced Electromagnetic Computation

A straightforward, easy-to-read introduction to the finite-difference time-domain (FDTD) method Finite-difference time-domain (FDTD) is one of the primary computational electrodynamics modeling techniques available. Since it is a time-domain method, FDTD solutions can cover a wide frequency

range with a single simulation run and treat nonlinear material properties in a natural way. Written in a tutorial fashion, starting with the simplest programs and guiding the reader up from one-dimensional to the more complex, three-dimensional programs, this book provides a simple, yet comprehensive introduction to the most widely used method for electromagnetic simulation. This fully updated edition presents many new applications, including the FDTD method being used in the design and analysis of highly resonant radio frequency (RF) coils often used for MRI. Each chapter contains a concise explanation of an essential concept and instruction on its implementation into computer code. Projects that increase in complexity are included, ranging from simulations in free space to propagation in dispersive media. Additionally, the text offers downloadable MATLAB and C programming languages from the book support site (http://booksupport.wiley.com). Simple to read and classroom-tested, Electromagnetic Simulation Using the FDTD Method is a useful reference for practicing engineers as well as undergraduate and graduate engineering students. Computational Electromagnetics is a young and growing discipline, expanding as a result of the steadily increasing demand for software for the design and analysis of electrical devices. This book introduces three of the most popular numerical methods for simulating electromagnetic fields: the finite difference method, the finite element method and the method of moments. In particular it focuses on how these methods are used to obtain valid approximations to the solutions of Maxwell's equations, using, for example, "staggered grids" and "edge elements." The main goal of the book is to make the reader aware of different sources of errors in numerical computations, and also to provide the tools for assessing the

accuracy of numerical methods and their solutions. To reach this goal, convergence analysis, extrapolation, von Neumann stability analysis, and dispersion analysis are introduced and used frequently throughout the book. Another major goal of the book is to provide students with enough practical understanding of the methods so they are able to write simple programs on their own. To achieve this, the book contains several MATLAB programs and detailed description of practical issues such as assembly of finite element matrices and handling of unstructured meshes. Finally, the book aims at making the students well-aware of the strengths and weaknesses of the different methods, so they can decide which method is best for each problem. In this second edition, extensive computer projects are added as well as new material throughout. Reviews of previous edition: "The well-written monograph is devoted to students at the undergraduate level, but is also useful for practising engineers." (Zentralblatt MATH, 2007)

The title of this book, Plasmonics: Principles and Applications, encompasses theory, technical issues, and practical applications which are of interest for diverse classes of the plasmonics. The book is a collection of the contemporary researches and developments in the area of plasmonics technology. It consists of 21 chapters that focus on interesting topics of modeling and computational methods, plasmonic structures for light transmission, focusing, and guiding, emerging concepts, and applications.

Absorption and Scattering of Light by Small Particles Treating absorption and scattering in equal measure, this self-contained, interdisciplinary study examines and illustrates how small particles absorb and scatter light. The authors emphasize that any discussion of the optical behavior of small particles is

inseparable from a full understanding of the optical behavior of the parent material-bulk matter. To divorce one concept from the other is to render any study on scattering theory seriously incomplete. Special features and important topics covered in this book include: * Classical theories of optical properties based on idealized models * Measurements for three representative materials: magnesium oxide, aluminum, and water * An extensive discussion of electromagnetic theory * Numerous exact and approximate solutions to various scattering problems * Examples and applications from physics, astrophysics, atmospheric physics, and biophysics * Some 500 references emphasizing work done since Kerker's 1969 work on scattering theory * Computer programs for calculating scattering by spheres, coated spheres, and infinite cylinders
Electromagnetic Waves, Materials, and Computation with MATLAB
Silicon Photonics Design
Radio Wave Propagation and Parabolic Equation Modeling
Computational Photonics
Estimation of complex permittivity of composite multilayer material at microwave frequency using waveguide measurements
Advances in photonics and nanotechnology have the potential to revolutionize humanity's ability to communicate and compute. To pursue these advances, it is mandatory to understand and properly model interactions of light with materials such as silicon and gold at the nanoscale, i.e., the span of a few tens of atoms laid side by side. These interactions are governed by the fundamental Maxwell's equations of classical electrodynamics, supplemented by quantum electrodynamics. This book presents the current state-of-the-art in formulating and implementing computational models of

these interactions. Maxwell's equations are solved using the finite-difference time-domain (FDTD) technique, pioneered by the senior editor, whose prior Artech House books in this area are among the top ten most-cited in the history of engineering. This cutting-edge resource helps readers understand the latest developments in computational modeling of nanoscale optical microscopy and microchip lithography, as well as nanoscale plasmonics and biophotonics.

Digital sound synthesis has long been approached using standard digital filtering techniques. Newer synthesis strategies, however, make use of physical descriptions of musical instruments, and allow for much more realistic and complex sound production and thereby synthesis becomes a problem of simulation. This book has a special focus on time domain finite difference methods presented within an audio framework. It covers time series and difference operators, and basic tools for the construction and analysis of finite difference schemes, including frequency-domain and energy-based methods, with special attention paid to problems inherent to sound synthesis. Various basic lumped systems and excitation mechanisms are covered, followed by a look at the 1D wave equation, linear bar and string vibration, acoustic tube modelling, and linear membrane and plate vibration. Various advanced topics, such as the nonlinear vibration of strings and plates, are given an elaborate treatment. Key features: Includes a historical overview of digital sound synthesis techniques, highlighting the links between the various physical modelling methodologies. A pedagogical presentation containing over 150 problems and programming exercises, and numerous figures and diagrams, and code fragments in the MATLAB® programming language helps the reader with limited experience of numerical

methods reach an understanding of this subject. Offers a complete treatment of all of the major families of musical instruments, including certain audio effects. Numerical Sound Synthesis is suitable for audio and software engineers, and researchers in digital audio, sound synthesis and more general musical acoustics. Graduate students in electrical engineering, mechanical engineering or computer science, working on the more technical side of digital audio and sound synthesis, will also find this book of interest.

Electromagnetic Theory and Plasmonics for Engineers

Computational Electromagnetics

Plasmonics

An Introduction with MATLAB

Handbook of Microwave Technology for Food Application