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Modeling Optical Waveguide Using Matlab Guided Wave Photonics Advanced Electromagnetic Computation Waveguide Structuring and Bragg Grating Fabrication by Ultraviolet Light Induced Refractive Index Changes in Photosensitive Optical Materials Proceedings of the International Conference on Atomic, Molecular, Optical & Nano Physics with Applications Silicon Photonics Design Fourier Modal Method and Its Applications in Computational Nanophotonics Electromagnetic and Photonic Simulation for the Beginner: Finite-Difference Frequency-Domain in MATLAB® Elastic Wave Propagation in Structures and Materials Photonic Crystals Asymmetric Dual Core Waveguides Computational Photonics EM Material Characterization Techniques for Metamaterials Millimeter-Wave Waveguides Full Matlab Code for Synthesis and Optimization of Bragg Gratings Electromagnetic Waves, Materials, and Computation with MATLAB® Wireless and Guided Wave Electromagnetics Radio Wave Propagation and Parabolic Equation Modeling Computational Electromagnetics Handbook of Research on 5G Networks and Advancements in Computing, Electronics, and Electrical Engineering Electromagnetic Theory and Plasmonics for Engineers Fundamentals of Acoustical Oceanography Advanced Engineering Electromagnetics Integrated Photonics Applied Electromagnetics Numerical Solution for a 3D Rectangular Waveguide Using the Finite Volume Control Method Optical Multi-Bound Solitons Microwave Integrated Circuit Components Design through MATLAB® Optical Modulation Optical Signal Processing by Silicon Photonics Physics of Oscillations and Waves Evolvable Systems: From Biology to Hardware Electromagnetic Waves, Materials, and Computation with MATLAB Nonlinear Optical Systems Electromagnetic Propagation and Waveguides in Photonics and Microwave Engineering Finite Elements, Electromagnetics and Design Modern Perspectives in Theoretical Physics Numerical Techniques in Electromagnetics with MATLAB, Third Edition Wireless and Guided Wave Electromagnetics Fractal Apertures in Waveguides, Conducting Screens and Cavities

Optical Signal Processing by Silicon Photonics Aug 27 2020 The main objective of this book is to make respective graduate students understand the nonlinear effects inside SOI waveguide and possible applications of SOI waveguides in this emerging research area of optical fibre communication. This book focuses on achieving successful optical frequency shifting by Four Wave Mixing (FWM) in silicon-on-insulator (SOI) waveguide by exploiting a nonlinear phenomenon.
Electromagnetic Waves, Materials, and Computation with MATLAB May 24 2020 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
Finite Elements, Electromagnetics and Design Feb 19 2020 Advanced topics of research in field computation are explored in this publication. Contributions have been sourced from international experts, ensuring a comprehensive specialist perspective. A unity of style has been achieved by the editor, who has specifically inserted appropriate cross-references throughout the volume, plus a single collected set of references at the end. The book provides a multi-faceted overview of the power and effectiveness of computation techniques in engineering electromagnetics. In addition to examining recent and current developments, it is hoped that it will stimulate further research in the field.
Photonic Crystals May 16 2022 The great interest in photonic crystals and their applications in the last 15 years is being expressed in the publishing of a large number of monographs, collections, textbooks and tutorials, where existing knowledge concerning - eration principles of photonic crystal devices and microstructured ?bers, their mathematicaldescription,well-knownandnovelapplicationsofsuchtechno- gies in photonics and optical communications are presented. They challenges authors of new books to cover the gaps still existing in the literature and highlight and popularize of already known material in a new and original manner. Authorsofthisbookbelievethatthenextsteptowardswideapplicationof photoniccrystalsisthesolutionofmanypracticalproblemsofdesignandc- putation of the speci?c photonic crystal-based devices aimed at the speci?c technicalapplication.Inordertomakethisstep,itisnecessarytoincreasethe number of practitioners who can solve such problems independently. The aim of this book is to extend the group of researchers, developers and students, who could practically use the knowledge on the physics of photonic crystals together with the knowledge and skills of independent calculation of basic characteristics of photonic crystals and modeling of various elements of - tegrated circuits and optical communication systems created on the basis of photonic crystals. The book is intended for quali?ed readers, specialists in the ?eld of optics and photonics, students of higher courses, master degree students and PhD students. As an introduction to the snopest, the book contains the basics of wave optics and radiation propagation in simple guiding media such as planar waveguides and step-index ?bers.
Electromagnetic Propagation and Waveguides in Photonics and Microwave Engineering Mar 22 2020 Optical and microwave waveguides have attracted much research interest in both science and industry. The number of potential applications for their use is growing rapidly. This book examines recent advances in the broad field of waveguide technology. It covers current progress and latest breakthroughs in emergent applications in photonics and microwave engineering. The book includes ten contributions on recent developments in waveguide technologies including theory, simulation, and fabrication of novel waveguide concepts as well as reviews on recent advances.
Optical Multi-Bound Solitons Nov 29 2020 Optical Multi-Bound Solitons describes the generation and transmission of multi-bound solitons with the potential to form the basis of the temporal coding of optical data packets for next-generation nonlinear optical systems. The book deals with nonlinear systems in terms of their fundamental principles, associated phenomena, and signal processing applications in contemporary optical systems for communications and laser systems, with a touch of mathematical representation of nonlinear equations to offer insight into the nonlinear dynamics at different phases. The text not only delineates the strong background physics of such systems but also: Discusses the phase evolution of the optical carriers under the soliton envelopes for the generation of multi-bound solitons Explains the generation of multi-bound solitons through optical fibers Examines new types of multi-bound solitons in passive and active optical resonators Conducts bi-spectral analyses of multi-bound solitons to identify the phase and power amplitude distribution property of bound solitons Presents experimental techniques for the effective generation of bound solitons Optical Multi-Bound Solitons provides extensive coverage of multi-bound solitons from the dynamics of their formation to their transmission over guided optical media. Appendices are included to supplement a number of essential definitions, mathematical representations, and derivations, making this book an ideal theoretical reference text as well as a practical professional guidebook.
Fourier Modal Method and Its Applications in Computational Nanophotonics Aug 19 2022 Most available books on computational electrodynamics are focused on FDTD, FEM, or other specific technique developed in microwave engineering. In contrast, Fourier Modal Method and Its Applications in Computational Nanophotonics is a complete guide to the principles and detailed mathematics of the up-to-date Fourier modal method of optical analysis. It takes readers through the implementation of MATLAB® codes for practical modeling of well-known and promising nanophotonic structures. The authors also address the limitations of the Fourier modal method. Features Provides a comprehensive guide to the principles, methods, and mathematics of the Fourier modal method Explores the emerging field of computational nanophotonics Presents clear, step-by-step, practical explanations on how to use the Fourier modal method for photonics and nanophotonics applications Includes the necessary MATLAB codes, enabling readers to construct their own code Using this book, graduate students and researchers can learn about nanophotonics simulations through a comprehensive treatment of the mathematics underlying the Fourier modal method and examples of practical problems solved with MATLAB codes.
Electromagnetic Waves, Materials, and Computation with MATLAB® Nov 10 2021 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 the program is executing the wrong simulation of the physical problem. Electromagnetic Waves, Materials, and Computation with MATLAB® takes an integrative modern approach to the subject of electromagnetic analysis by supplementing quintessential "old school" information and methods with instruction in the use of newer commercial software such as MATLAB and methods including FDTD. Delving into the electromagnetics of bounded simple media, equations of complex media, and computation, this text includes: Appendices that cover a wide range of associated issues and techniques A concluding section containing an array of problems, quizzes, and examinations A downloadable component for instructors including PowerPointTM slides, solutions to problems, and more Striking a balance between theoretical and practical aspects, internationally recognized expert Dikshitulu Kalluri clearly illustrates how intuitive approximate solutions are derived. Providing case studies and practical examples throughout, he examines the role of commercial software in this process, also covering interpretation of findings. Kalluri’s extensive experience teaching this subject enables him to streamline and convey material in a way that helps readers master conceptual mathematical aspects. This gives them confidence in their ability to use high-level software to write code, but it also ensures that they will never be solely dependent on such programs.
EM Material Characterization Techniques for Metamaterials Feb 13 2022 This book presents a review of techniques based on waveguide systems, striplines, freespace systems and more, discussing the salient features of each method in detail. Since metamaterials are typically inhomogeneous and anisotropic, the experimental techniques for electromagnetic (EM) material characterization of metamaterial structures need to tackle several challenges. Furthermore, the modes supported by metamaterial structures are extremely sensitive to external perturbations. As such the measurement fixtures for EM material characterization have to be modified to account for such effects. The book provides a valuable resource for researchers working in the field of metamaterials
Fundamentals of Acoustical Oceanography May 04 2021 The developments in the field of ocean acoustics over recent years make this book an important reference for specialists in acoustics, oceanography, marine biology, and related fields. Fundamentals of Acoustical Oceanography also encourages a new generation of scientists, engineers, and entrepreneurs to apply the modern methods of acoustical physics to probe the unknown sea. The book is an authoritative, modern text with examples and exercises. It contains techniques to solve the direct problems, solutions of inverse problems, and an extensive bibliography from the earliest use of sound in the sea to present references. Written by internationally recognized scientists, the book provides background to measure ocean parameters and processes, find life and objects in the sea, communicate underwater, and survey the boundaries of the sea. Fundamentals of Acoustical Oceanography explains principles of underwater sound propagation, and describes how both actively probing sonars and passively listening hydrophones can reveal what the eye cannot see over vast ranges of the turbid ocean. This book demonstrates how to use acoustical remote sensing, variations in sound transmission, in situ acoustical measurements, and computer and laboratory models to identify the physical and biological parameters and processes in the sea. * Offers an integrated, modern approach to passive and active underwater acoustics * Contains many examples of laboratory scale models of ocean-acoustic environments, as well as descriptions of experiments at sea * Covers remote sensing of marine life and the seafloor * Includes signal processing of ocean sounds, physical and biological noises at sea, and inversions * resents sound sources, receivers, and calibration * Explains high intensities; explosive waves, parametric sources, cavitation, shock waves, and streaming * Covers microbubbles from breaking waves, rainfall, dispersion, and attenuation * Describes sound propagation along ray paths and caustics * Presents sound transmissions and normal mode methods in ocean waveguides
Silicon Photonics Design Sep 20 2022 From design and simulation through to testing and fabrication, this hands-on introduction to silicon photonics engineering equips students with everything they need to begin creating foundry-ready designs. In-depth discussion of real-world issues and fabrication challenges ensures that students are fully equipped for careers in industry. Step-by-step tutorials, straightforward examples, and illustrative source code fragments guide students through every aspect of the design process, providing a practical framework for developing and refining key skills. Offering industry-ready expertise, the text supports existing PDKs for CMOS UV-lithography foundry services (OpSIS, ePIXfab, imec, LETI, IME and CMC) and the development of new kits for proprietary processes and clean-room based research. Accompanied by additional online resources to support students, this is the perfect learning package for senior undergraduate and graduate students studying silicon photonics design, and academic and industrial researchers involved in the development and manufacture of new silicon photonics systems.
Handbook of Research on 5G Networks and Advancements in Computing, Electronics, and Electrical Engineering Jul 06 2021 The advent of the emerging fifth generation (5G) networks has changed the paradigm of how computing, electronics, and electrical (CEE) systems are interconnected. CEE devices and systems, with the help of the 5G technology, can now be seamlessly linked in a way that is rapidly turning the globe into a digital world. Smart cities and internet of things have come to stay but not without some challenges, which must be discussed. The Handbook of Research on 5G Networks and Advancements in Computing, Electronics, and Electrical Engineering focuses on current technological innovations as the world rapidly heads towards becoming a

global smart city. It covers important topics such as power systems, electrical engineering, mobile communications, network, security, and more. This book examines vast types of technologies and their roles in society with a focus on how each works, the impacts it has, and the future for developing a global smart city. This book is ideal for both industrial and academic researchers, scientists, engineers, educators, practitioners, developers, policymakers, scholars, and students interested in 5G technology and the future of engineering, computing, and technology in human society.
Advanced Engineering Electromagnetics Apr 03 2021 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.
Computational Electromagnetics Aug 07 2021 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)
Electromagnetic and Photonic Simulation for the Beginner: Finite-Difference Frequency-Domain in MATLAB® Jul 18 2022 This book teaches the finite-difference frequency-domain (FDFD) method from the simplest concepts to advanced three-dimensional simulations. It uses plain language and high-quality graphics to help the complete beginner grasp all the concepts quickly and visually. This single resource includes everything needed to simulate a wide variety of different electromagnetic and photonic devices. The book is filled with helpful guidance and computational wisdom that will help the reader easily simulate their own devices and more easily learn and implement other methods in computational electromagnetics. Special techniques in MATLAB® are presented that will allow the reader to write their own FDFD programs. Key concepts in electromagnetics are reviewed so the reader can fully understand the calculations happening in FDFD. A powerful method for implementing the finite-difference method is taught that will enable the reader to solve entirely new differential equations and sets of differential equations in mere minutes. Separate chapters are included that describe how Maxwell's equations are approximated using finite-differences and how outgoing waves can be absorbed using a perfectly matched layer absorbing boundary. With this background, a chapter describes how to calculate guided modes in waveguides and transmission lines. The effective index method is taught as way to model many three-dimensional devices in just two-dimensions. Another chapter describes how to calculate photonic band diagrams and isofrequency contours to quickly estimate the properties of periodic structures like photonic crystals. Next, a chapter presents how to analyze diffraction gratings and calculate the power coupled into each diffraction order. This book shows that many devices can be simulated in the context of a diffraction grating including guided-mode resonance filters, photonic crystals, polarizers, metamaterials, frequency selective surfaces, and metasurfaces. Plane wave sources, Gaussian beam sources, and guided-mode sources are all described in detail, allowing devices to be simulated in multiple ways. An optical integrated circuit is simulated using the effective index method to build a two-dimensional model of the 3D device and then launch a guided-mode source into the circuit. A chapter is included to describe how the code can be modified to easily perform parameter sweeps, such as plotting reflection and transmission as a function of frequency, wavelength, angle of incidence, or a dimension of the device. The last chapter is advanced and teaches FDFD for three-dimensional devices composed of anisotropic materials. It includes simulations of a crossed grating, a doubly-periodic guided-mode resonance filter, a frequency selective surface, and an invisibility cloak. The chapter also includes a parameter retrieval from a left-handed metamaterial. The book includes all the MATLAB codes and detailed explanations of all programs. This will allow the reader to easily modify the codes to simulate their own ideas and devices. The author has created a website where the MATLAB codes can be downloaded, errata can be seen, and other learning resources can be accessed. This is an ideal book for both an undergraduate elective course as well as a graduate course in computational electromagnetics because it covers the background material so well and includes examples of many different types of devices that will be of interest to a very wide audience.
Proceedings of the International Conference on Atomic, Molecular, Optical & Nano Physics with Applications Oct 21 2022 This book highlights the proceedings of the International Conference on Atomic, Molecular, Optical and Nano-Physics with Applications (CAMNP 2019), organized by the Department of Applied Physics, Delhi Technological University, New Delhi, India. It presents experimental and theoretical studies of atoms, ions, molecules and nanostructures both at the fundamental level and on the application side using advanced technology. It highlights how modern tools of high-field and ultra-fast physics are no longer merely used to observe nature but can be used to reshape and redirect atoms, molecules, particles or radiation. It brings together leading researchers and professionals on the field to present and discuss the latest finding in the following areas, but not limited to: Atomic and Molecular Structure, Collision Processes, Data Production and Applications Spectroscopy of Solar and Stellar Plasma Intense Field, Short Pulse Laser and Atto-Second Physics Laser Technology, Quantum Optics and applications Bose Einstein condensation Nanomaterials and Nanoscience Nanobiotechnolgy and Nanophotonics Nano and Micro-Electronics Computational Condensed Matter Physics
Guided Wave Photonics Jan 24 2023 A comprehensive presentation of the theory and simulation of optical waveguides and wave propagations in a guided environment, Guided Wave Photonics: Fundamentals and Applications with MATLAB supplies fundamental and advanced understanding of integrated optical devices that are currently employed in modern optical fiber communications systems and p
Electromagnetic Theory and Plasmonics for Engineers Jun 05 2021 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.
Modeling Optical Waveguide Using Matlab Feb 25 2023
Computational Photonics Mar 14 2022 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.
Radio Wave Propagation and Parabolic Equation Modeling Sep 08 2021 An important contribution to the literature that introduces powerful new methods for modeling and simulating radio wave propagation A thorough understanding of electromagnetic wave propagation is fundamental to the development of sophisticated communication and detection technologies. The powerful numerical methods described in this book represent a major step forward in our ability to accurately model electromagnetic wave propagation in order to establish and maintain reliable communication links, to detect targets in radar systems, and to maintain robust mobile phone and broadcasting networks. The first new book on guided wave propagation modeling and simulation to appear in nearly two decades, Radio Wave Propagation and Parabolic Equation Modeling addresses the fundamentals of electromagnetic wave propagation generally, with a specific focus on radio wave propagation through various media. The authors explore an array of new applications, and detail various virtual electromagnetic tools for solving several frequent electromagnetic propagation problems. All of the methods described are presented within the context of real-world scenarios typifying the differing effects of various environments on radio-wave propagation. This valuable text: Addresses groundwave and surface wave propagation Explains radar applications in terms of parabolic equation modeling and simulation approaches Introduces several simple and sophisticated MATLAB scripts Teaches applications that work with a wide range of electromagnetic, acoustic and optical wave propagation modeling Presents the material in a quick-reference format ideal for busy researchers and engineers Radio Wave Propagation and Parabolic Equation Modeling is a critical resource forelectrical, electronics, communication, and computer engineers working on industrial and military applications that rely on the directed propagation of radio waves. It is also a useful reference for advanced engineering students and academic researchers.
Evolvable Systems: From Biology to Hardware Jun 24 2020 In the mid 1990s, researchers began applying Evolutionary Algorithms (EAs) on a kind of computer chip that could dynamically alter the functionality and physicalconnectionsofits circuits. This combinationofEAs withprogrammable electronics (e. g. , Field Programmable Gate Arrays (FPGAs) and Field P- grammable Analogue Arrays (FPAAs)) spawned a new ?eld of Evolutionary Computation (EC) called Evolvable Hardware (EH) with its ?rst workshop, - wards Evolvable Hardware, held in Lausanne, Switzerland in October 1995. This workshop was followed by the First International Conference on Evolvable S- tems: From Biology to Hardware (ICES' 96), held inTsukuba,Japanin October 1996. The second ICES was held in Lausanne, September 1998, the third was in Edinburgh, April 2000, the fourth was in Tokyo, October 2001, the ?fth was in Trondheim, March 2003, the sixth was in Sitges, September 2005, and the seventh was in Wuhan, September 2007. Over the years the EH ?eld has expanded beyond the use of EAs on simple electronic devices to encompass many di?erent combinations of EAs and biol- ically inspired algorithms (BIAs) with various physical devices (or simulations of physical devices). Present research in the ?eld of EH can be split into the two related areas of Evolvable HardwareDesign (EHD) and Adaptive Hardware (AH). Evolvable Hardware Design (EHD) is the use of EAs and BIAs for cre- ing physical devices and designs, examples of where EHD has had some success include analogue and digital electronics,antennas,MEMS chips, opticalsystems aswell asquantum circuits.
Advanced Electromagnetic Computation Dec 23 2022 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.
Asymmetric Dual Core Waveguides Apr 15 2022 This book highlights the dynamical behavior of self-similar waves in asymmetric dual-core waveguides. The proposed dual-core waveguide consists of two closely spaced adjoining fibers in which one fiber is active and the other is passive. Due to the linear coupling between them, the dynamics of the wave propagating through the passive core can be controlled by manipulating the dynamics of the wave propagating in the active core. The optimal pulse compression or amplification of these waves as the length of the fiber tends to infinity is presented. The exact Mobius transform self-similar solutions that propagate through these waveguides self-similarly are subject to simple scaling rules. The book includes experiments conducted to corroborate the analytical predictions.
Numerical Techniques in Electromagnetics with MATLAB, Third Edition Dec 19 2019 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.
Nonlinear Optical Systems Apr 22 2020 Nonlinear Optical Systems: Principles, Phenomena, and Advanced Signal Processing is a simplified overview of the evolution of technology associated with nonlinear systems and advanced signal processing. This book's coverage ranges from fundamentals to phenomena to the most cutting-edge aspects of systems for next-generation biomedical monitoring an
Full Matlab Code for Synthesis and Optimization of Bragg Gratings Dec 11 2021 This book presents a theoretical description of fiber Bragg gratings, focusing on channels' densification and the tunability of Bragg filters. It also includes a full Matlab code for the synthesis and optimization of several kinds of fiber Bragg gratings by using the directed tabu search, the simulated annealing method and the genetic algorithm. Physical and optical parameters of uniform, chirped and sampled fiber Bragg gratings are then reconstructed with these algorithms.
Wireless and Guided Wave Electromagnetics Nov 17 2019 Wireless communications allow high-speed mobile access to a global Internet based on ultra-wideband backbone intercontinental and terrestrial networks. Both of these environments support the carrying of information via electromagnetic waves that are wireless (in free air) or guided through optical fibers. Wireless and Guided Wave Electromagnetics: Fundamentals and Applications explores the fundamental aspects of electromagnetic waves in wireless media and wired guided media. This is an essential subject for engineers and physicists working with communication technologies, mobile networks, and optical communications. This comprehensive book: Builds from the basics to modern topics in electromagnetics for wireless and optical fiber communication Examines wireless radiation and the guiding of optical waves, which are crucial for carrying high-speed information in long-reach optical networking scenarios Explains the physical phenomena and practical aspects of guiding optical waves that may not require detailed electromagnetic solutions Explores applications of electromagnetic waves in optical communication systems and networks based on frequency domain transfer functions in the linear regions, which simplifies the physical complexity of the waves but still allows them to be examined from a system engineering perspective Uses MATLAB® and Simulink® models to simulate and illustrate the electromagnetic fields Includes worked examples, laboratory exercises, and problem sets to test understanding The book's modular structure makes it suitable for a variety of courses, for self-study, or as a resource for research and development. Throughout, the author emphasizes issues commonly faced by engineers. Going a step beyond traditional electromagnetics textbooks, this book highlights specific uses of electromagnetic waves with a focus on the wireless and optical technologies that are increasingly important for high-speed transmission over very long distances.
Microwave Integrated Circuit Components Design through MATLAB® Oct 29 2020 MICROWAVE INTEGRATED CIRCUIT COMPONENTS DESIGN THROUGH MATLAB® This book teaches the student community microwave integrated circuit component design through MATLAB®, helping the reader to become conversant in using codes and, thereafter, commercial software for verification purposes only. Microwave circuit theory and its comparisons, transmission line networks, S-parameters, ABCD parameters, basic design parameters of planar transmission lines (striplines, microstrips, slot lines, coplanar waveguides, finlines), filter theory, Smith chart, inverted Smith chart, stability circles, noise figure circles and microwave components, are thoroughly explained in the book. The chapters are planned in such a way that readers get a thorough understanding to ensure expertise in design. Aimed at senior undergraduates, graduates and researchers in electrical engineering, electromagnetics, microwave circuit design and communications engineering, this book: • Explains basic tools for design and analysis of microwave circuits such as the Smith chart and network parameters • Gives the advantage of realizing the output without wiring the circuit by simulating through MATLAB code • Compares distributed theory with network theory • Includes microwave components, filters and amplifiers S. Raghavan was a Senior Professor (HAG) in the Department of Electronics and Communication Engineering, National Institute of Technology (NIT), Trichy, India and has 39 years of teaching and research experience at the Institute. His interests include: microwave integrated circuits, RF MEMS, Bio MEMS, metamaterial, frequency selective surfaces (FSS), substrate integrated waveguides (SIW), biomedical engineering and microwave engineering. He has established state-of-the-art MICs and microwave research laboratories at NIT, Trichy with funding from the Indian government. He is a Fellow/Senior Member in more than 24 professional societies including: IEEE (MTT, EMBS, APS), IETE, IEI, CSI, TSI, ISSS, ILA and ISOI. He is twice a recipient of the Best Teacher Award, and has received the Life Time Achievement Award, Distinguished Professor of Microwave Integrated Circuit Award and Best Researcher Award.
Physics of Oscillations and Waves Jul 26 2020 In this textbook a combination of standard mathematics and modern numerical methods is used to describe a wide range of natural wave phenomena, such as sound, light and water waves, particularly in specific popular contexts, e.g. colors or the acoustics of musical instruments. It introduces the reader to the basic physical principles that allow the description of the oscillatory motion of matter and classical fields, as well as resulting concepts including interference, diffraction, and coherence. Numerical methods offer new scientific insights and make it possible to handle interesting cases that can't readily be addressed using analytical mathematics; this holds true not only for problem solving but also for the description of phenomena. Essential physical parameters are brought more into focus, rather than concentrating on the details of which mathematical trick should be used to obtain a certain solution. Readers will learn how time-resolved frequency analysis offers a deeper understanding of the interplay between frequency and time, which is relevant to many phenomena involving oscillations and waves. Attention is also drawn to common misconceptions resulting from uncritical use of the Fourier transform. The book offers an ideal guide for upper-level undergraduate physics students and will also benefit physics instructors. Program codes in Matlab and Python, together with interesting files for use in the problems, are provided as free supplementary material.
Elastic Wave Propagation in Structures and Materials Jun 17 2022 Elastic Wave Propagation in Structures and Materials initiates with a brief introduction to wave propagation, different wave equations, integral transforms including fundamentals of Fourier Transform, Wavelet Transform, Laplace Transform and their numerical implementation. Concept of spectral analysis and procedure to compute the wave parameters, wave propagation in 1-D isotropic waveguides, wave dispersion in 2-D waveguides is explained. Wave propagation in different media such as laminated composites, functionally graded structures, granular soils including non-local elasticity models is addressed. The entire book is written in modular form and analysis is performed in frequency domain. Features: Brings out idea of wave dispersion and its utility in the dynamic responses. Introduces concepts as Negative Group Speeds, Einstein's Causality and escape frequencies using solid mathematical framework. Discusses the propagation of waves in materials such as laminated composites and functionally graded materials. Proposes spectral finite element as analysis tool for wave propagation. Each concept/chapter supported by homework problems and MATLAB/FORTRAN codes. This book aims at Senior Undergraduates and Advanced Graduates in all streams of engineering especially Mechanical and Aerospace Engineering.
Numerical Solution for a 3D Rectangular Waveguide Using the Finite Volume Control Method Dec 31 2020 In this thesis, a numerical method is introduced to solve a 3D rectangular waveg uide using the Finite Volume Control Method. Essentially, this numerical method finds its main applications in Computational Fluid Dynamics problems and has bee n rarely used in Electromagnetics. The 3D rectangular waveguide under considerat ion is coupled through its apertures to two infinite conducting planes. The aper ture's shape and size are the same as the waveguide cross-section. The work star ts by deriving the analytical forms of the domain and boundary equations in orde r to discretize them using the Finite Volume Control method. The governing equat ion inside the waveguide is called the Helmholtz equation. All the boundary equa tions, except those related to the apertures, are known as the Von Neumann bound ary conditions. The main complexity arises in the discretization of the aperture boundary equations. In fact, those equations do not exhibit any of the classic forms of boundary equations recognized in the Finite Volume Control method. The refore a new problem is introduced. This new problem adopts a "Surface Control" approach over the two apertures where each aperture is divided into control area s of dimensions equal to the control volumes of the initial problem. This result s in three dependent systems of algebraic simultaneous equations that require a computational technique to be solved. Consequently, a code is created to solve t he three systems using Matlab R2008b. The code starts by meshing the domain. The n a hybrid direct and iterative approach is adopted to solve the systems of equa tions. The best case results lead to residual in the range of ten to the power m inus four. This can be considered an acceptable upper bound for convergence sin ce Matlab does not tolerate a large number of nodes which certainly affects the accuracy of the results and the convergence criterion. The results are then vali dated using Ansoft HFSS v10.0. The Matlab results are very close to the HFSS re sults with minor discrepancies mainly due to capacity and memory limitations imp osed by Matlab.
Optical Modulation Sep 27 2020 This books aims to present fundamental aspects of optical communication techniques and advanced modulation techniques and extensive applications of optical communications systems and networks employing single-mode optical fibers as the transmission system. New digital techqniues such as chromatic dispersion, polarization mode dispersion, nonlinear phase distortion effects, etc. will be discussed. Practical models for practice and understanding the behavior and dynamics of the devices and systems will be included.
Integrated Photonics Mar 02 2021 From the beginning Integrated Photonics introduces numerical techniques for studying non-analytic structures. Most chapters have numerical problems designed for solution using a computational program such as Matlab or Mathematica. An entire chapter is devoted to one of the numeric simulation techniques being used in optoelectronic design (the Beam Propagation Method), and provides opportunity for students to explore some novel optical structures without too much effort. Small pieces of code are supplied where appropriate to get the reader started on the numeric work. Integrated Photonics is designed for the senior/first year graduate student, and requires a basic familiarity with electromagnetic waves, and the ability to solve differential equations with boundary conditions.
Millimeter-Wave Waveguides Jan 12 2022 Millimeter-Wave Waveguides is a monograph devoted to open waveguides for millimeter wave applications. In the first chapters, general waveguide theory is presented (with the emphasis on millimeter wave applications). Next, the book systematically describes the results of both theoretical and experimental studies of rectangular dielectric rod waveguides with high dielectric permittivities. Simple and accurate methods for propagation constant calculations for isotropic as well as anisotropic dielectric waveguides are described. Both analytical and numerical approaches are covered. Different types of transitions have been simulated in order to find optimal configurations as well as optimal dimensions of dielectric waveguides for the frequency band of 75-110 GHz. Simple and effective design is presented. The experimental studies of dielectric waveguides show that Sapphire waveguide can be utilized for this frequency band as a very low-loss waveguide. Design of antennas with low return loss based on dielectric waveguides is also described.
Waveguide Structuring and Bragg Grating Fabrication by Ultraviolet Light Induced Refractive Index Changes in Photosensitive Optical Materials Nov 22 2022
Fractal Apertures in Waveguides, Conducting Screens and Cavities Oct 17 2019 This book deals with the design and analysis of fractal apertures in waveguides, conducting screens and cavities using numerical electromagnetics and field-solvers. The aim is to obtain design solutions with improved accuracy for a wide range of applications. To achieve this goal, a few diverse problems are considered. The book is organized with adequate space dedicated for the design and analysis of fractal apertures in waveguides, conducting screens and cavities, microwave/millimeter wave applications followed by detailed case-study problems to infuse better insight and understanding of the subject. Finally, summaries and suggestions are given for future work. Fractal geometries were widely used in electromagnetics, specifically for antennas and frequency selective surfaces (FSS). The self-similarity of fractal geometry gives rise to a multiband response, whereas the space-filling nature of the fractal geometries makes it an efficient element in antenna and FSS unit cell miniaturization. Until now, no efforts were made to study the behavior of these fractal geometries for aperture coupling problems. The aperture coupling problem is an important boundary value problem in electromagnetics and used in waveguide filters and power dividers, slotted ground planes, frequency selective surfaces and metamaterials. The present book is intended to initiate a study of the characteristics of fractal apertures in waveguides, conducting screens and cavities. To perform a unified analysis of these entirely dissimilar problems, the "generalized network formulation of the aperture problems" by Mautz and Harrington was extended to multiple-aperture geometry. The authors consider the problem of coupling between two arbitrary regions coupled together via multiple apertures of arbitrary shape. MATLAB codes were developed for the problems and validated with the results available in the literature as well as through simulations on ANSOFT's HFSS.
Applied Electromagnetics Feb 01 2021 STUDENT COMPANION SITE Every new copy of Stuart Wentworth's Applied Electromagnetics comes with a registration code which allows access to the Student's Book Companion Site. On the BCS the student will find: * Detailed Solutions to Odd-Numbered Problems in the text * Detailed Solutions to all Drill Problems from the text * MATLAB code for all the MATLAB examples in the text * Additional MATLAB demonstrations with code. This includes a Transmission Lines simulator created by the author. * Weblinks to a vast array of resources for the engineering student. Go to www.wiley.com/college/wentworth to link to Applied Electromagnetics and the Student Companion Site. ABOUT THE PHOTO Passive RFID systems, consisting of readers and tags, are expected to replace bar codes as the primary means of identification, inventory and billing of everyday items. The tags typically consist of an RFID chip placed on a flexible film containing a planar antenna. The antenna captures radiation from the reader's signal to power the tag electronics, which then responds to the reader's query. The PENI Tag (Product Emitting Numbering Identification Tag) shown, developed by the University of Pittsburgh in a team led by Professor Marlin H. Mickle, integrates the antenna with the rest of the tag electronics. RFID systems involve many electomagnetics concepts, including antennas, radiation, transmission lines, and microwave circuit components. (Photo courtesy of Marlin H. Mickle.)
Wireless and Guided Wave Electromagnetics Oct 09 2021 Wireless communications allow high-speed mobile access to a global Internet based on ultra-wideband backbone intercontinental and terrestrial networks. Both of these environments support the carrying of information via electromagnetic waves that are wireless (in free air) or guided through optical fibers. Wireless and Guided Wave Electromagnetics: Fundamentals and Applications explores the fundamental aspects of electromagnetic waves in wireless media and wired guided media. This is an essential subject for

engineers and physicists working with communication technologies, mobile networks, and optical communications. This comprehensive book: Builds from the basics to modern topics in electromagnetics for wireless and optical fiber communication Examines wireless radiation and the guiding of optical waves, which are crucial for carrying high-speed information in long-reach optical networking scenarios Explains the physical phenomena and practical aspects of guiding optical waves that may not require detailed electromagnetic solutions Explores applications of electromagnetic waves in optical communication systems and networks based on frequency domain transfer functions in the linear regions, which simplifies the physical complexity of the waves but still allows them to be examined from a system engineering perspective Uses MATLAB® and Simulink® models to simulate and illustrate the electromagnetic fields Includes worked examples, laboratory exercises, and problem sets to test understanding The book's modular structure makes it suitable for a variety of courses, for self-study, or as a resource for research and development. Throughout, the author emphasizes issues commonly faced by engineers. Going a step beyond traditional electromagnetics textbooks, this book highlights specific uses of electromagnetic waves with a focus on the wireless and optical technologies that are increasingly important for high-speed transmission over very long distances.
Modern Perspectives in Theoretical Physics Jan 20 2020 This book highlights the review of articles in theoretical physics by the students of Professor K. Babu Joseph, as a Festschrift for his 80th Birthday. This book is divided into four sections based on the contributions of Babu Joseph and his students. The four sections are Cosmology, High Energy Physics, Mathematical Physics and Non-linear Dynamics and its applications.