Computational Electrodynamics The Finite Difference Time Domain Method Third Edition

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Computational Techniques (TU, syllabus) Chapter 5: Finite Difference Method and Numerical ExamplePlasmonic Nanoparticles and Nanostructures (Ivan Smalyukh) Computational Electrodynamics The Finite Difference

This extensively revised and expanded third edition of the Artech House bestseller, Computational Electrodynamics: The Finite-Difference Time-Domain Method, offers engineers the most up-to-date and definitive resource on this critical method for solving Maxwell's equations.

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Computational Electrodynamics : The Finite Difference Time Domain Method (Text Only) - 2nd edition. Computational Electrodynamics : The Finite-Difference Time-Domain Method / With CD - 2nd edition. Shop Us With Confidence. Summary. This single resource provides complete guidance on FDTD techniques and applications, from basic concepts to the current state of the art.

Computational Electrodynamics : The Finite-Difference Time ...
Computational Electrodynamics: The Finite-Difference Time-Domain Method (Artech House Antennas and Propagation Library) 2nd Bk&CD edition by Taflove, Allen, Hagness, Susan C. (2000) Hardcover Hardcover January 1, 1600. Book recommendations, author interviews, editors' picks, and more. Read it now.

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Computational Electrodynamics: The Finite-Difference Time ...
Computational Electrodynamics. : Written by the pioneer and foremost authority on the subject, this new book is both a comprehensive university textbook and professional/research reference on the...

Computational Electrodynamics: The Finite-difference Time ...
Computational Electrodynamics: The Finite-Difference Time-Domain Method.

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Taflove, A & Hagness, SC 2000, Computational Electrodynamics: The Finite-Difference Time-Domain Method. 2nd edn, Artech House, Norwood, MA. Computational Electrodynamics : The Finite-Difference Time-Domain Method.

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Computational Electrodynamics - CERN
Computational electromagnetics (CEM), computational electrodynamics or electromagnetic modeling is the process of modeling the interaction of electromagnetic fields with physical objects and the environment.. It typically involves using computer programs to compute approximate solutions to Maxwell's equations to calculate antenna performance, electromagnetic compatibility, radar cross section ...

Computational electromagnetics - Wikipedia
One technique is the finite-difference time-domain (FDTD) method, which is an effective approach for calculation of propagation constants of guided modes. In this method, the continuous...

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Computational Electrodynamics: The Finite-Difference Time-Domain Method. This extensively revised and expanded third edition of the Artech House bestseller, Computational Electrodynamics: The Finite-Difference Time-Domain Method, offers engineers the most up-to-date and definitive resource on this critical method for solving Maxwell's equations. The method helps practitioners design antennas, wireless communications devices, high-speed digital.

Computational Electrodynamics: The Finite-Difference Time ...
In 1995, Prof. Taflove authored the textbook/research monograph, Computational Electrodynamics: The Finite-Difference Time-Domain Method. In 1998, he edited the research monograph, Advances in Computational Electrodynamics: The Finite-Difference Time-Domain Method. Subsequently, he and Prof. Susan Hagness of the University of Wisconsin-Madison expanded and updated the 1995 book in a year-2000 second edition, and then further expanded and updated the 2000 second edition in a 2005 third edition.

Allen Taflove - Wikipedia
This extensively revised and expanded third edition of the Artech House bestseller, Computational Electrodynamics: The Finite-Difference Time-Domain Method, offers you the most up-to-date and definitive resource on this critical method for solving Maxwell's equations. There has been considerable advancement in FDTD computational technology over the past few years, and this new edition brings you the very latest details with four new invited chapters on advanced techniques for PSTD ...

ARTECH HOUSE USA : Computational Electrodynamics, Third ...
The Finite-Difference Time-Domain (FDTD) method is a time-honoured approach to solve Maxwell's equations (Taflove 2005). It relies on a finite-difference discretization of the partial time...

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Computational electrodynamics: the finite-difference time-domain method. 2005, Artech House in ...

Computational electrodynamics (2005 edition) | Open Library
In September 2012, Allen's major publication, Computational Electrodynamics: The Finite-Difference Time-Domain Method, was ranked as the 7th most-cited book in physics, according to a Google Scholar (GS) search conducted by the University of Rochester's Institute of Optics (see Most-cited physics books).

Allen Taflove and Finite-Difference Time-Domain (FDTD ...
Computational electrodynamics is a vast research field with a wide variety of tools. In physics, the principle of gauge invariance plays a pivotal role as a guide towards a sensible formulation of the laws of nature as well as for computing the properties of elementary particles using the lattice formulation of gauge theories.

This work represents a university text and professional/research reference on the finite-difference time-domain computational solution method for Maxwell's equations. Sections cover numerical stability, numerical dispersion and dispersive, nonlinear and gain methods of FD-TD and antenna analysis.

This extensively revised and expanded third edition of the Artech House bestseller, Computational Electrodynamics: The Finite-Difference Time-Domain Method, offers you the most up-to-date and definitive resource on this critical method for solving Maxwell's equations. There has been considerable advancement in FDTD computational technology over the past few years, and this new edition brings you the very latest details with four new invited chapters on advanced techniques for PSTD, unconditional stability, provably stable FDTD-FETD hybrids, and hardware acceleration. Moreover, you find many completely new sections throughout the book, including major updates on convolutional PML ABCs; dispersive, nonlinear, classical-gain, and quantum-gain materials; and micro-, nano-, and bio- photonics.

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.

Essentials of Computational Electromagnetics provides an in-depth introduction of the three main full-wave numerical methods in computational electromagnetics (CEM); namely, the method of moment (MoM), the finite element method (FEM), and the finite-difference time-domain (FDTD) method. Numerous monographs can be found addressing one of the above three methods. However, few give a broad general overview of essentials embodied in these methods, or were published too early to include recent advances. Furthermore, many existing monographs only present the final numerical results without specifying practical issues, such as how to convert discretized formulations into computer programs, and the numerical characteristics of the computer programs. In this book, the authors elaborate the above three methods in CEM using practical case studies, explaining their own research experiences along with a review of current literature. A full analysis is provided for typical cases, including characteristics of numerical methods, helping beginners to develop a quick and deep understanding of the essentials of CEM. Outlines practical issues, such as how to convert discretized formulations into computer programs Gives typical computer programs and their numerical characteristics along with line by line explanations of programs Uses practical examples from the authors' own work as well as in the current literature Includes exercise problems to give readers a better understanding of the material Introduces the available commercial software and their limitations This book is intended for graduate-level students in antennas and propagation, microwaves, microelectronics, and electromagnetics. This text can also be used by researchers in electrical and electronic engineering, and software developers interested in writing their own code or understanding the detailed workings of code. Companion website for the book: www.wiley.com/go/sheng/cem

Finite-Difference Time-Domain (FD-TD) modeling is arguably the most popular and powerful means available to perform detailed electromagnetic engineering analyses. Edited by the pioneer and foremost authority on the subject, here is the first book to assemble in one resource the latest techniques and results of the leading theoreticians and practitioners of FD-TD computational electromagnetics modeling.

Introduction to the Finite-Difference Time-Domain (FDTD) Method for Electromagnetics provides a comprehensive tutorial of the most widely used method for solving Maxwell's equations -- the Finite Difference Time-Domain Method. This book is an essential guide for students, researchers, and professional engineers who want to gain a fundamental knowledge of the FDTD method. It can accompany an undergraduate or entry-level graduate course or be used for self-study. The book provides all the background required to either research or apply the FDTD method for the solution of Maxwell's equations to practical problems in engineering and science. Introduction to the Finite-Difference Time-Domain (FDTD) Method for Electromagnetics guides the reader through the foundational theory of the FDTD method starting with the one-dimensional transmission-line problem and then progressing to the solution of Maxwell's equations in three dimensions. It also provides step by step guides to modeling physical sources, lumped-circuit components, absorbing boundary conditions, perfectly matched layer absorbers, and sub-cell structures. Post processing methods such as network parameter extraction and far-field transformations are also detailed. Efficient implementations of the FDTD method in a high level language are also provided. Table of Contents: Introduction / 1D FDTD Modeling of the Transmission Line Equations / Yee Algorithm for Maxwell's Equations / Source Excitations / Absorbing Boundary Conditions / The Perfectly Matched Layer (PML) Absorbing Medium / Subcell Modeling / Post Processing

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)

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

Computational electrodynamics is a vast research field with a wide variety of tools. In physics, the principle of gauge invariance plays a pivotal role as a guide towards a sensible formulation of the laws of nature as well as for computing the properties of elementary particles using the lattice formulation of gauge theories. However, the gauge principle has played a much less pronounced role in performing computation in classical electrodynamics. In this work, the author demonstrates that starting from the gauge formulation of electrodynamics using the electromagnetic potentials leads to computational tools that can very well compete with the conventional electromagnetic field-based tools. Once accepting the formulation based on gauge fields, the computational code is very transparent due to the mimetic mapping of the electrodynamic variables on the computational grid. Although the illustrations and applications originate from microelectronic engineering, the method has a much larger range of applicability. Therefore this book will be useful to everyone having interest in computational electrodynamics. The volume is organized as follows: In part 1, a detailed introduction and overview is presented of the Maxwell equations as well as the derivation of the current and charge densities in different materials. Semiconductors are responding to electromagnetic fields in a non-linear way, and the induced complications are discussed in detail. Part 2, using the gauge potentials, presents the transition of electrodynamics theory to a formulation that can serve as the gateway to computational code. In part 3, a collection of microelectronic device designs demonstrate the feasibility and success of the methods in Part 2. Part 4 focuses on a set of topical themes that brings the reader to the frontier of research in building the simulation tools, using the gauge principle in computational electrodynamics. Technical topics discussed in the book include: - Electromagnetic Field Equations - Constitutive Relations - Discretization and Numerical Analysis - Finite Element and Finite Volume Methods - Design of Integrated Passive Components

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.