

Numerical Solution of Antennas in Layered Media

Hansen, Vw

Numerical Solution Of Antennas In Layered Media

David B. Davidson



Numerical Solution Of Antennas In Layered Media:

Numerical Solution of Antennas in Layered Media Volkert W. Hansen, 1989 This monograph presents a variety of methods for the numerical solution of practical problems especially transient responses in layered media which occur in microwave antenna installations Provides a survey of the present state of research covering the modern applications of methods such as Green's function and the Sommerfeld integrals to practical problems involving dipoles focusing antennas and model calculations

Numerical Solution of Antennas in Layered Media Volkert W. Hansen, 1989 Antenna Theory and Design Warren L. Stutzman, Gary A. Thiele, 2012-05-22 Stutzman's 3rd edition of Antenna Theory and Design provides a more pedagogical approach with a greater emphasis on computational methods New features include additional modern material to make the text more exciting and relevant to practicing engineers new chapters on systems low profile elements and base station antennas organizational changes to improve understanding more details to selected important topics such as microstrip antennas and arrays and expanded measurements topic Computational Electromagnetics for RF and Microwave Engineering David B. Davidson, 2010-10-28 This hands on introduction to computational electromagnetics CEM links theoretical coverage of the three key methods the FDTD MoM and FEM to open source MATLAB codes freely available online in 1D 2D and 3D together with many practical hints and tips gleaned from the author's 25 years of experience in the field Updated and extensively revised this second edition includes a new chapter on 1D FEM analysis and extended 3D treatments of the FDTD MoM and FEM with entirely new 3D MATLAB codes Coverage of higher order finite elements in 1D 2D and 3D is also provided with supporting code in addition to a detailed 1D example of the FDTD from a FEM perspective With running examples through the book and end of chapter problems to aid understanding this is ideal for professional engineers and senior undergraduate graduate students who need to master CEM and avoid common pitfalls in writing code and using existing software

Mathematical Models and Numerical Methods for Full Wave Analysis of Prolate and Oblate Spheroidal Conformal Microwave Components Saif Al-Hasson, 2014-08-29 Conformal components are used nowadays at higher rate than ever before They can be found in curved mobile phones communication navigation and imaging systems in land water air and space vehicles The integration of those components within the external structure became of significant importance for aerodynamic electromagnetic aesthetic or physical reasons As a result many mathematical models were previously developed to analyze and optimize such conformed devices In this thesis we contributed to this field by developing various models for full wave analysis of spheroidal components As a starting point mathematical formulas for conforming antennas on oblate and prolate spheroids were obtained Those conformation methods were validated by conforming many antennas on spheroidal surfaces They were then used to formulate Method of Moments equations with spheroidally curved current functions for analyzing wire antennas of random shape conformed to spheroids in the frequency domain The complete model was applied to a conformal Archimedean spiral antenna on an oblate spheroid and

showed that the conformed spiral has similar current distribution as its planar counterpart but produces an unsymmetrical radiation pattern. The obtained model was then extended to spheroidal multi layer structures by integrating the spheroidal dyadic Green's Function within its mathematical derivation. However, due to a detected divergence in that function, the model couldn't be implemented. On the side of time based analysis methods, a Finite Difference Time Domain method was developed for closed oblate and prolate spheroidal structures. Alternative formulas for the structure's singularities and the condition of numerical stability were derived as well. The obtained model was then validated and used to characterize spheroidal cavities in the time and frequency domains. The method was extended later to unbounded spheroidal domain by deriving the Absorbing Boundary Conditions using the One Way Wave method. The whole model was then applied to characterize a patch antenna conformed to a prolate spheroid. Finally, an analytical solution for the transient fields in spherical multilayer media energized by spherical harmonics source and an algorithm for tracing back the path of all the reflected waves were obtained. The model was applied to different multilayer structures where the transient response was obtained and validated against a numerical solution.

Computational Methods and Experimental Measurements XIII C. A. Brebbia, G. M. Carlomagno, 2007. Containing papers presented at the Thirteenth International Conference in this well established series on CMEM. Computational Methods and Experimental Measurements. These proceedings review state of the art developments on the interaction between numerical methods and experimental measurements. Featured topics include Computational and Experimental Methods, Experimental and Computational Analysis, Computer Interaction and Control of Experiments, Direct, Indirect and In Situ Measurements, Particle Methods, Structural and Stress Analysis, Structural Dynamics, Dynamics and Vibrations, Electrical and Electromagnetic Applications, Biomedical Applications, Heat Transfer, Thermal Processes, Fluid Flow, Data Acquisition, Remediation and Processing and Industrial Applications.

Computational Methods for Electromagnetic and Optical Systems John M. Jarem, Partha P. Banerjee, 2016-04-19. The current rapid and complex advancement applications of electromagnetic (EM) and optical systems calls for a much needed update on the computational methods currently in use. Completely revised and reflecting ten years of developments, this second edition of the bestselling *Computational Methods for Electromagnetic and Optical Systems* provides the update so desperately needed in this field. Offering a wealth of new material, this second edition begins with scalar wave propagation and analysis techniques, chiral and metamaterials and photonic band gap structures. It examines Poynting vector and stored energy as well as energy group and phase velocities, reviews k space state variable formulation with applications to anisotropic planar systems and presents full field rigorous coupled wave analysis of planar diffraction gratings with applications to H mode, E mode, crossed gratings, single and multilayered diffraction grating analysis and diffraction from anisotropic gratings. Later chapters highlight spectral techniques and RCWA as applied to the analysis of dynamic wave mixing in PR materials with induced transmission and reflection gratings and demonstrate the RCWA algorithm to analyze cylindrical and spherical systems using circular bipolar cylindrical

and spherical coordinates The book concludes with several RCWA computational case studies involving scattering from spatially inhomogeneous eccentric circular cylinders solved in bipolar coordinates Many of these examples apply the complex Poynting theorem or the forwardscattering optical theorem to validate numerical solutions by verifying power conservation Using common computational tools such as Fortran MATLAB COMSOL and RSOFTE the text offers numerous examples to illuminate the material many of which employ a full field vector approach to analyze and solve Maxwell s equations in anisotropic media where a standard wave equation approach is intractable Designed to introduce novel spectral computational techniques the book demonstrates the application of these methods to analyze a variety of EM and optical systems

Microstrip and Printed Antennas Debatosh Guha,Yahia M. M. Antar,2011-02-02 This book focuses on new techniques analysis applications and future trends of microstrip and printed antenna technologies with particular emphasis to recent advances from the last decade Attention is given to fundamental concepts and techniques their practical applications and the future scope of developments Several topics essayed as individual chapters include reconfigurable antenna ultra wideband UWB antenna reflectarrays antennas for RFID systems and also those for body area networks Also included are antennas using metamaterials and defected ground structures DGSs Essential aspects including advanced design analysis and optimization techniques based on the recent developments have also been addressed Key Features Addresses emerging hot topics of research and applications in microstrip and printed antennas Considers the fundamental concepts techniques applications and future scope of such technologies Discusses modern applications such as wireless base station to mobile handset satellite earth station to airborne communication systems radio frequency identification RFID to body area networks etc Contributions from highly regarded experts and pioneers from the US Europe and Asia This book provides a reference for R D researchers professors practicing engineers and scientists working in these fields Graduate students studying working on related subjects will find this book as a comprehensive literature for understanding the present and future trends in microstrip and printed antennas

Computational Methods for Electromagnetic and Optical Systems, Second Edition John M. Jarem,Partha P. Banerjee,2011 This text examines a variety of spectral computational techniques including k space theory Floquet theory and beam propagation that are used to analyze electromagnetic and optical problems The authors tie together different applications in EM and optics in which the state variable method is used Emphasizing the analysis of planar diffraction gratings using rigorous coupled wave analysis the book presents many cases that are analyzed using a full field vector approach to solve Maxwell s equations in anisotropic media where a standard wave equation approach is intractable

Perfectly Matched Layer (PML) for Computational Electromagnetics Jean-Pierre Bérenger,2022-06-01 This lecture presents the perfectly matched layer PML absorbing boundary condition ABC used to simulate free space when solving the Maxwell equations with such finite methods as the finite difference time domain FDTD method or the finite element method The frequency domain and the time domain equations are derived for the different

forms of PML media namely the split PML the CPML the NPML and the uniaxial PML in the cases of PMLs matched to isotropic anisotropic and dispersive media The implementation of the PML ABC in the FDTD method is presented in detail Propagation and reflection of waves in the discretized FDTD space are derived and discussed with a special emphasis on the problem of evanescent waves The optimization of the PML ABC is addressed in two typical applications of the FDTD method first wave structure interaction problems and secondly waveguide problems Finally a review of the literature on the application of the PML ABC to other numerical techniques of electromagnetics and to other partial differential equations of physics is provided In addition a software package for computing the actual reflection from a FDTD PML is provided It is available here [Antenna Radar Cross Section: Theory and Design](#) Ying Liu,Yongtao Jia,Shuxi Gong,2025-04-19 This is the first book to focus specifically on antenna RCS reduction theory and design approaches It covers both principles and engineering practice and provides an in depth study of a number of important topics including fundamental theory antenna and array analysis models the rapid numerical computation method and various low RCS antenna design methods The comprehensive and systematic discussion of practical issues in antenna RCS reduction makes it an ideal resource for readers interested in practical solutions to antenna stealth particularly researchers engineers and graduate students in the fields of microwave engineering electrical and electronic engineering and telecommunications engineering *Recent Technical Developments in Energy-Efficient 5G Mobile Cells* Raed A. Abd-Alhameed,Issa Elfergani,Jonathan Rodriguez,2020-06-17 This book addresses the true innovation in engineering design that may be promoted by blending together models and methodologies from different disciplines and in this book the target was exactly to follow this approach to deliver a new disruptive architecture to deliver these next generation mobile small cell technologies According to this design philosophy the work within this book resides in the intersection of engineering paradigms that includes cooperation network coding and smart energy aware frontends These technologies will not only be considered as individual building blocks but re engineered according to an inter design approach resulting in the enabler for energy efficient femtocell like services on the move The book aims to narrow the gap between the current networking technologies and the foreseen requirements that are targeted at the future development of the 5G mobile and wireless communications networks in terms of the higher networking capacity the ability to support more users the lower cost per bit the enhanced energy efficiency and adaptability to new services and devices for example smart cities and the Internet of things IoT **Scientific and Technical Aerospace Reports** ,1995 [Proceedings of International conference on Antenna Technologies](#) ,2005 **Research in Progress** United States. Army Research Office,1985 Vols for 1977 consist of two parts Chemistry biological sciences engineering sciences metallurgy and materials science issued in the spring and Physics electronics mathematics geosciences issued in the fall **Applied Mechanics Reviews** ,1978 *Research in Progress* ,1982 **Higher-Order FDTD Schemes for Waveguides and Antenna Structures** Nikolaos V. Kantartzis,Theodoros D. Tsiboukis,2022-06-01 This publication provides

a comprehensive and systematically organized coverage of higher order finite difference time domain or FDTD schemes demonstrating their potential role as a powerful modeling tool in computational electromagnetics Special emphasis is drawn on the analysis of contemporary waveguide and antenna structures Acknowledged as a significant breakthrough in the evolution of the original Yee's algorithm the higher order FDTD operators remain the subject of an ongoing scientific research Among their indisputable merits one can distinguish the enhanced levels of accuracy even for coarse grid resolutions the fast convergence rates and the adjustable stability In fact as the fabrication standards of modern systems get stricter it is apparent that such properties become very appealing for the accomplishment of elaborate and credible designs

Advances in FDTD Computational Electrodynamics Allen Taflov, Ardavan Oskooi, Steven G. Johnson, 2013 Advances in photonics and nanotechnology have the potential to revolutionize humanity's ability to communicate and compute This book helps readers understand the developments in computational modeling of nanoscale optical microscopy and microchip lithography as well as nanoscale plasmonics and biophotonics

Theory and Computation of Electromagnetic Fields Jian-Ming Jin, 2015-08-10 Reviews the fundamental concepts behind the theory and computation of electromagnetic fields The book is divided in two parts The first part covers both fundamental theories such as vector analysis Maxwell's equations boundary condition and transmission line theory and advanced topics such as wave transformation addition theorems and fields in layered media in order to benefit students at all levels The second part of the book covers the major computational methods for numerical analysis of electromagnetic fields for engineering applications These methods include the three fundamental approaches for numerical analysis of electromagnetic fields the finite difference method the finite difference time domain method in particular the finite element method and the integral equation based moment method The second part also examines fast algorithms for solving integral equations and hybrid techniques that combine different numerical methods to seek more efficient solutions of complicated electromagnetic problems

Theory and Computation of Electromagnetic Fields Second Edition Provides the foundation necessary for graduate students to learn and understand more advanced topics Discusses electromagnetic analysis in rectangular cylindrical and spherical coordinates Covers computational electromagnetics in both frequency and time domains Includes new and updated homework problems and examples Theory and Computation of Electromagnetic Fields Second Edition is written for advanced undergraduate and graduate level electrical engineering students This book can also be used as a reference for professional engineers interested in learning about analysis and computation skills

Unveiling the Magic of Words: A Overview of "**Numerical Solution Of Antennas In Layered Media**"

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