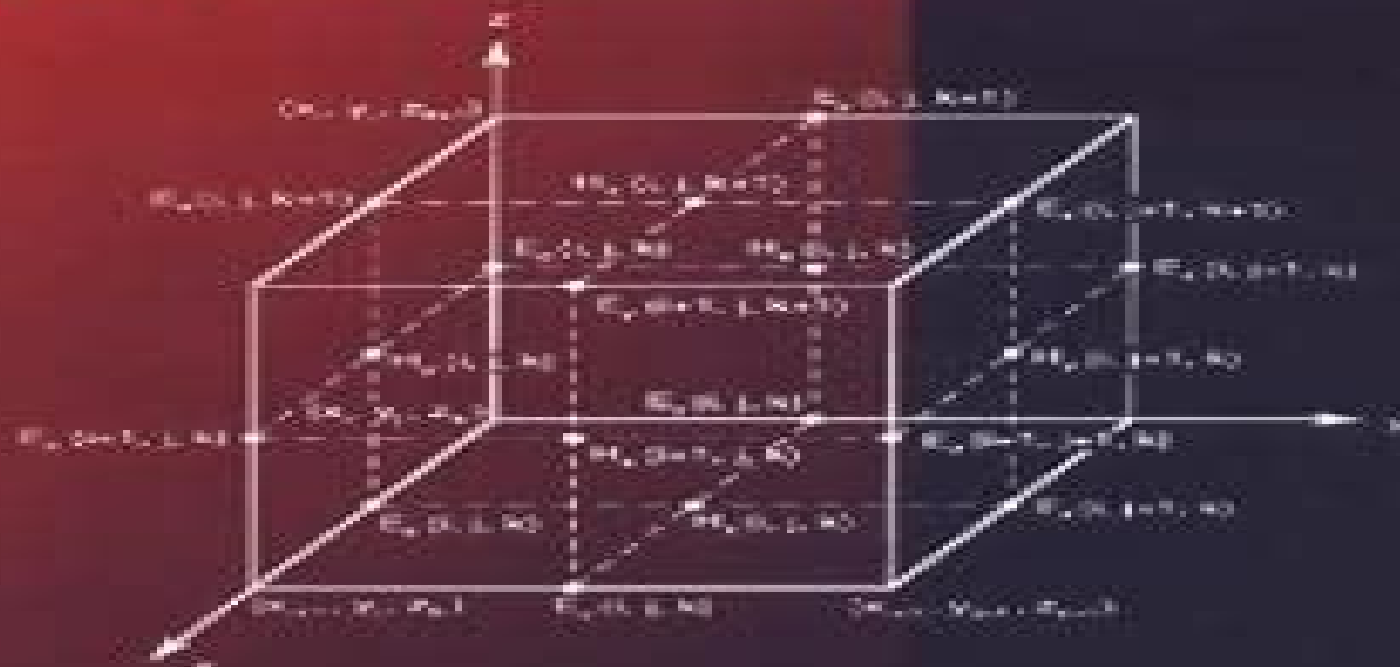


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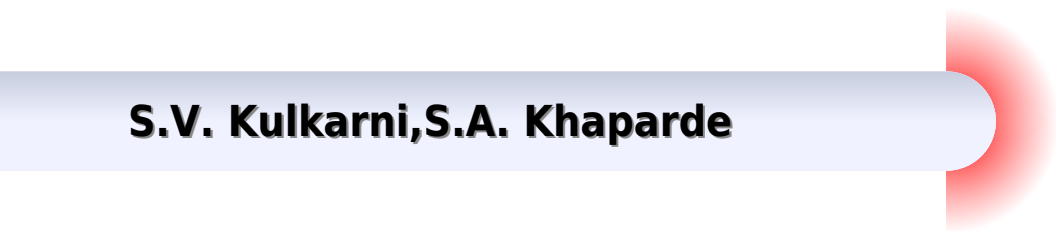
Second Edition



Matthew N. O. Sadiku

Sadiku Numerical Techniques In Electromagnetics 2nd Edition

S.V. Kulkarni, S.A. Khaparde



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Numerical Techniques in Electromagnetics, Second Edition Matthew N.O. Sadiku, 2000-07-12 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

Analytical and Computational Methods in Electromagnetics Ramesh Garg, 2008 This authoritative resource offers you clear and complete explanation of this essential electromagnetics knowledge providing you with the analytical background you need to understand such key approaches as MoM method of moments FDTD Finite Difference Time Domain and FEM Finite Element Method and Green's functions This comprehensive book includes all math necessary to master the material

The Finite Element Method in Electromagnetics Jian-Ming Jin, 2015-02-18 A new edition of the leading textbook on the finite element method incorporating major advancements and further applications in the field of electromagnetics The finite element method FEM is a powerful simulation technique used to solve boundary value problems in a variety of engineering circumstances It has been widely used for analysis of electromagnetic fields in antennas radar scattering RF and microwave engineering high speed high frequency circuits wireless communication electromagnetic compatibility photonics remote sensing biomedical engineering and space exploration The Finite Element Method in Electromagnetics Third Edition explains the method's processes and techniques in careful meticulous prose and covers not only essential finite element method theory but also its latest developments and applications giving engineers a methodical way to quickly master this very powerful numerical technique for solving practical often complicated electromagnetic problems Featuring over thirty percent new material the third edition of this essential and comprehensive text now includes A wider range of applications including antennas phased arrays electric machines high frequency circuits and crystal photonics The finite element analysis of wave propagation scattering and radiation in periodic structures The time domain finite element method for analysis of wideband antennas and transient electromagnetic

phenomena Novel domain decomposition techniques for parallel computation and efficient simulation of large scale problems such as phased array antennas and photonic crystals Along with a great many examples The Finite Element Method in Electromagnetics is an ideal book for engineering students as well as for professionals in the field

Multiresolution Frequency Domain Technique for Electromagnetics Mesut Gökten,Atef Elsherbeni,Ercument Arvas,2022-06-01 In this book a general frequency domain numerical method similar to the finite difference frequency domain FDFD technique is presented The proposed method called the multiresolution frequency domain MRFD technique is based on orthogonal Battle Lemarie and biorthogonal Cohen Daubechies Feauveau CDF wavelets The objective of developing this new technique is to achieve a frequency domain scheme which exhibits improved computational efficiency figures compared to the traditional FDFD method reduced memory and simulation time requirements while retaining numerical accuracy The newly introduced MRFD scheme is successfully applied to the analysis of a number of electromagnetic problems such as computation of resonance frequencies of one and three dimensional resonators analysis of propagation characteristics of general guided wave structures and electromagnetic scattering from two dimensional dielectric objects The efficiency characteristics of MRFD techniques based on different wavelets are compared to each other and that of the FDFD method Results indicate that the MRFD techniques provide substantial savings in terms of execution time and memory requirements compared to the traditional FDFD method Table of Contents Introduction Basics of the Finite Difference Method and Multiresolution Analysis Formulation of the Multiresolution Frequency Domain Schemes Application of MRFD Formulation to Closed Space Structures Application of MRFD Formulation to Open Space Structures A Multiresolution Frequency Domain Formulation for Inhomogeneous Media Conclusion

Transformer Engineering S.V. Kulkarni,S.A. Khaparde,2017-12-19 Transformer Engineering Design Technology and Diagnostics Second Edition helps you design better transformers apply advanced numerical field computations more effectively and tackle operational and maintenance issues Building on the bestselling Transformer Engineering Design and Practice this greatly expanded second edition also emphasizes diagnostic aspects and transformer system interactions What s New in This Edition Three new chapters on electromagnetic fields in transformers transformer system interactions and modeling and monitoring and diagnostics An extensively revised chapter on recent trends in transformer technology An extensively updated chapter on short circuit strength including failure mechanisms and safety factors A step by step procedure for designing a transformer Updates throughout reflecting advances in the field A blend of theory and practice this comprehensive book examines aspects of transformer engineering from design to diagnostics It thoroughly explains electromagnetic fields and the finite element method to help you solve practical problems related to transformers Coverage includes important design challenges such as eddy and stray loss evaluation and control transient response short circuit withstand and strength and insulation design The authors also give pointers for further research Students and engineers starting their careers will appreciate the sample design of a typical power transformer

Presenting in depth explanations modern computational techniques and emerging trends this is a valuable reference for those working in the transformer industry as well as for students and researchers It offers guidance in optimizing and enhancing transformer design manufacturing and condition monitoring to meet the challenges of a highly competitive market

Introduction to the Finite Element Method in Electromagnetics Anastasis C. Polycarpou, 2022-05-31 This series lecture is an introduction to the finite element method with applications in electromagnetics The finite element method is a numerical method that is used to solve boundary value problems characterized by a partial differential equation and a set of boundary conditions The geometrical domain of a boundary value problem is discretized using sub domain elements called the finite elements and the differential equation is applied to a single element after it is brought to a weak integro differential form A set of shape functions is used to represent the primary unknown variable in the element domain A set of linear equations is obtained for each element in the discretized domain A global matrix system is formed after the assembly of all elements This lecture is divided into two chapters Chapter 1 describes one dimensional boundary value problems with applications to electrostatic problems described by the Poisson s equation The accuracy of the finite element method is evaluated for linear and higher order elements by computing the numerical error based on two different definitions Chapter 2 describes two dimensional boundary value problems in the areas of electrostatics and electrodynamics time harmonic problems For the second category an absorbing boundary condition was imposed at the exterior boundary to simulate undisturbed wave propagation toward infinity Computations of the numerical error were performed in order to evaluate the accuracy and effectiveness of the method in solving electromagnetic problems Both chapters are accompanied by a number of Matlab codes which can be used by the reader to solve one and two dimensional boundary value problems These codes can be downloaded from the publisher s URL www.morganclaypool.com/page/polycarpou This lecture is written primarily for the nonexpert engineer or the undergraduate or graduate student who wants to learn for the first time the finite element method with applications to electromagnetics It is also targeted for research engineers who have knowledge of other numerical techniques and want to familiarize themselves with the finite element method The lecture begins with the basics of the method including formulating a boundary value problem using a weighted residual method and the Galerkin approach and continues with imposing all three types of boundary conditions including absorbing boundary conditions Another important topic of emphasis is the development of shape functions including those of higher order In simple words this series lecture provides the reader with all information necessary for someone to apply successfully the finite element method to one and two dimensional boundary value problems in electromagnetics It is suitable for newcomers in the field of finite elements in electromagnetics

Principles and Techniques of Electromagnetic Compatibility Christos Christopoulos, 2022-07-14 This book provides a sound grasp of the fundamental concepts applications and practice of EMC Developments in recent years have resulted in further increases in electrical component density wider penetration of wireless technologies and a

significant increase in complexity of electrical and electronic equipment New materials which can be customized to meet EMC needs have been introduced Considerable progress has been made in developing numerical tools for complete system EMC simulation EMC is now a central consideration in all industrial sectors Maintaining the holistic approach of the previous edition of Principles and Techniques of Electromagnetic Compatibility the Third Edition updates coverage of EMC to reflect recent important developments What is new in the Third Edition A comprehensive treatment of new materials meta and nano and their impact on EMC Numerical modelling of complex systems and complexity reduction methods Impact of wireless technologies and the Internet of Things IoT on EMC Testing in reverberation chambers and in the time domain A comprehensive treatment of the scope and development of stochastic models for EMC EMC issues encountered in automotive railway aerospace and marine applications Impact of EMC and Intentional EMI IEMI on infrastructure and risk assessment In addition to updating material new references examples and appendices were added to offer further support to readers interested in exploring further As in previous editions the emphasis is on building a sound theoretical framework and demonstrating how it can be turned to practical use in challenging applications The expectation is that this approach will serve EMC engineers through the inevitable future technological shifts and developments

Advances in Heat Transfer, 1999-02-24 Advances in Heat Transfer is designed to fill the information gap between regularly scheduled journals and university level textbooks by providing in depth review articles over a broader scope than is allowable in either journals or texts

Conjugate Gradient Algorithms and Finite Element Methods M. Křížek, 2004-06-11 The position taken in this collection of pedagogically written essays is that conjugate gradient algorithms and finite element methods complement each other extremely well Via their combinations practitioners have been able to solve complicated direct and inverse multidimensional problems modeled by ordinary or partial differential equations and inequalities not necessarily linear optimal control and optimal design being part of these problems The aim of this book is to present both methods in the context of complicated problems modeled by linear and nonlinear partial differential equations to provide an in depth discussion on their implementation aspects The authors show that conjugate gradient methods and finite element methods apply to the solution of real life problems They address graduate students as well as experts in scientific computing

Plasmonic Optical Antennas for Enhanced Light Detection and Emission Edward Simon Barnard, 2011 Antennas are used across a wide range of frequencies in the electromagnetic spectrum to concentrate wave energy into electronic circuits The principles that govern the operation of conventional radio frequency antennas can be extended to much higher frequencies and be applied to produce nano metallic i.e. plasmonic antennas that act as receivers and transmitters for visible light These traits make them excellent candidates for light trapping in solar cells light concentration in sub wavelength photodetectors or even localized heating for cancer therapies The unique optical properties of metals at visible frequencies make it difficult to apply traditional antenna design rules Using full field electromagnetic simulations and analytical antenna models we

developed new design rules for producing optical antennas with a desired set of optical properties We then applied these design rules to create antennas that resonantly enhance absorption on thin silicon detectors as well as enhance emission of cathodoluminescence CL Through spatial and spectral mapping of both photocurrent and CL we clearly show the fundamental and higher order resonant modes of these antennas With CL we are also able to map the spatial distribution of these resonant modes with nanometer resolution In addition to these specific demonstrated applications the results of this work enable optical engineers to more easily design a myriad of plasmonic devices that employ optical antenna structures including nanoscale photodetectors light sources sensors and modulators

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