



Second Edition

Theory and Computation of Electromagnetic Fields

JIAN-MING JIN

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Theory And Computation Of Electromagnetic Fields

James C. Lin



Theory And Computation Of Electromagnetic Fields:

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engineers interested in learning about analysis and computation skills

Theory and Computation of Electromagnetic Fields in Layered Media Vladimir Okhmatovski, Shucheng Zheng, 2024-04-23 Explore the algorithms and numerical methods used to compute electromagnetic fields in multi layered media In Theory and Computation of Electromagnetic Fields in Layered Media two distinguished electrical engineering researchers deliver a detailed and up to date overview of the theory and numerical methods used to determine electromagnetic fields in layered media The book begins with an introduction to Maxwell s equations the fundamentals of electromagnetic theory and concepts and definitions relating to Green s function It then moves on to solve canonical problems in vertical and horizontal dipole radiation describe Method of Moments schemes discuss integral equations governing electromagnetic fields and explains the Michalski Zheng theory of mixed potential Green s function representation in multi layered media Chapters on the evaluation of Sommerfeld integrals procedures for far field evaluation and the theory and application of hierarchical matrices are also included along with A thorough introduction to free space Green s functions including the delta function model for point charge and dipole current Comprehensive explorations of the traditional form of layered medium Green s function in three dimensions Practical discussions of electro quasi static and magneto quasi static fields in layered media including electrostatic fields in two and three dimensions In depth examinations of the rational function fitting method including direct spectra fitting with VECTFIT algorithms Perfect for scholars and students of electromagnetic analysis in layered media Theory and Computation of Electromagnetic Fields in Layered Media will also earn a place in the libraries of CAD industry engineers and software developers working in the area of computational electromagnetics

The Finite Element Method in Electromagnetics Jian-Ming Jin, 2014-03-31 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

Field Computation by Moment Methods Roger F. Harrington, 1996-01 This classic 1968 edition of *Field Computation by Moment Methods* is the first book to explore the computation of electromagnetic fields by the method of moments the most popular method for the numerical solution of electromagnetic field problems It presents a unified approach to moment methods by employing the concepts of linear spaces and functional analysis Written especially for those who have a minimal amount of experience in electromagnetic theory theoretical and mathematical are illustrated by examples that prepare all readers with the skills they need to apply the method of moments to new engineering related problems **Electromagnetic Field Theory Fundamentals** Bhag Singh Guru, Hüseyin R. Hiziroglu, 2009-07-23 Guru and Hiziroglu have produced an accessible and user friendly text on electromagnetics that will appeal to both students and professors teaching this course This lively book includes many worked examples and problems in every chapter as well as chapter summaries and background revision material where appropriate The book introduces undergraduate students to the basic concepts of electrostatic and magnetostatic fields before moving on to cover Maxwell's equations propagation transmission and radiation Chapters on the Finite Element and Finite Difference method and a detailed appendix on the Smith chart are additional enhancements MathCad code for many examples in the book and a comprehensive solutions set are available at www.cambridge.org/9780521830164 **Foundations of Geophysical Electromagnetic Theory and Methods** Michael S. Zhdanov, 2017-10-26 *Foundations of Geophysical Electromagnetic Theory and Methods* Second Edition builds on the strength of the first edition to offer a systematic exposition of geophysical electromagnetic theory and methods This new edition highlights progress made over the last decade with a special focus on recent advances in marine and airborne electromagnetic methods Also included are recent case histories on practical applications in tectonic studies mineral exploration environmental studies and off shore hydrocarbon exploration The book is ideal for geoscientists working in all areas of geophysics including exploration geophysics and applied physics as well as graduate students and researchers working in the field of electromagnetic theory and methods Presents theoretical and methodological foundations of geophysical field theory Synthesizes fundamental theory and the most recent achievements of electromagnetic EM geophysical methods in the framework of a unified systematic exposition Offers a unique breadth and completeness in providing a general picture of the current state of the art in EM geophysical technology Discusses practical aspects of EM exploration for mineral and energy resources *Electromagnetic Theory and Computation* Paul Wolfgang Gross, 2004 Although topology was recognized by Gauss and Maxwell to play a pivotal role in the formulation of electromagnetic boundary value problems it is a largely unexploited tool for field computation The development of algebraic topology since Maxwell provides a framework for linking data structures algorithms and computation to topological aspects of three

dimensional electromagnetic boundary value problems This book first published in 2004 attempts to expose the link between Maxwell and a modern approach to algorithms The first chapters lay out the relevant facts about homology and cohomology stressing their interpretations in electromagnetism These topological structures are subsequently tied to variational formulations in electromagnetics the finite element method algorithms and certain aspects of numerical linear algebra A recurring theme is the formulation of and algorithms for the problem of making branch cuts for computing magnetic scalar potentials and eddy currents

Advances in Electromagnetic Fields in Living Systems James C. Lin, 1994 Volume 2 in this series offers research into two specific regions of the electromagnetic spectrum extremely low frequency fields and radiofrequency radiation with particular emphasis on the latter The investigations explore melatonin synthesis and exposure to extremely low frequency ELF fields ELF fields and cancer computational bioelectromagnetics health effects including the carcinogenic potential of radiofrequency radiation radiofrequency radiation as an energy source for arrhythmia and practical applications of the radiofrequency exposure standard

Atomic and Molecular Nonlinear Optics: Theory, Experiment and Computation G. Maroulis, T. Bancewicz, B. Champagne, 2011-05-27 The papers collected in this volume in honor of the late Stanis aw Kielich cover an impressive range of modern subjects in molecular science These subjects include among others the nonlinear optics of molecules new approaches to the electronic structure of large molecules the properties of carbon nanotubes fluorescence polarization spectroscopy computational studies of systems of fundamental interest to collision induced spectroscopy the simulation of fluids NLO materials chemical bonding in complex molecules the NLO properties of functionalized DNA and the magnetic properties of molecular assemblies Written by eminent specialists the papers should offer valuable guidance to a wide community of graduate students and researchers

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