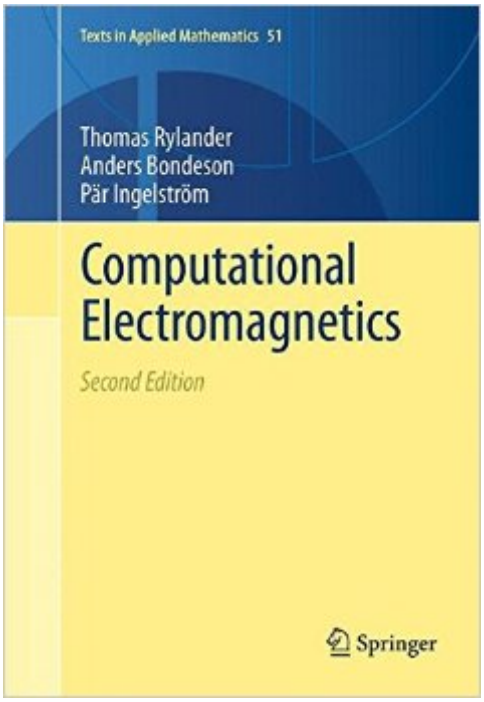
Computational Electromagnetics (Texts In Applied Mathematics)



Synopsis

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 thisÂ second edition, extensive computer projects are added as well as new material throughout.Reviews of previous edition:Â "The well-written monograph is devoted to students at the undergraduate level, but is also useful for practising engineers." (Zentralblatt MATH, 2007)

Book Information

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Customer Reviews

This is a book that I definitely would not recommend as an introductory text for CEM. The book is short and very terse and often does not include a lot of detail or examples. Some sections are downright pathetic in their treatment of the material. For example section 5.3.2 on FDTD Near-to-Far-Field Transformations is only two paragraphs long. It only gives the high-level principles behind the method without discussing at all how to actually implement it. You're much better off learning this subject from "Theory and Computation of Electromagnetic Fields" by Jin, "Computational Electrodynamics: The Finite-Difference Time-Domain Method, Third Edition" by Tafove, or John Schneider's free online book here: [...], though the latter two only cover FDTD. That being said, it might be a somewhat decent and compact reference for those already familiar with CEM.

A excellent introduction, actually more than an introduction, to the three main CEM methods.

and Matrix Analysis (Undergraduate Texts in Mathematics) Numerical Partial Differential Equations: Finite Difference Methods (Texts in Applied Mathematics) Numerical Methods for Fluid Dynamics: With Applications to Geophysics (Texts in Applied Mathematics) Fibonacci and Lucas Numbers with Applications, Volume One (Pure and Applied Mathematics: A Wiley Series of Texts, Monographs and Tracts) Introduction to Numerical Analysis (Texts in Applied Mathematics)