

Numerical Methods for Engineering: An Introduction Using MATLAB and Computational Electromagnetics

By Karl F. Warnick

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This textbook teaches students to create computer codes used to engineer antennas, microwave circuits, and other critical technologies for wireless communications and other applications of electromagnetic fields and waves. Worked code examples are provided for MATLAB technical computing software. It is the only textbook on numerical methods that begins at the undergraduate engineering student level but bring students to the state-of-the-art by the end of the book. It focuses on the most important and popular numerical methods, going into depth with examples and problem sets of escalating complexity. This book requires only one core course of electromagnetics, allowing it to be useful both at the senior and beginning graduate levels. Developing and using numerical methods in a powerful tool for students to learn the principles of intermediate and advanced electromagnetics. This book fills the missing space of current textbooks that either lack depth on key topics (particularly integral equations and the method of moments) and where the treatment is not accessible to students without an advanced theory course. Important topics include: Method of Moments; Finite Difference Time Domain Method; Finite Element Method; Finite Element Method-Boundary Element Method; Numerical Optimization; and Inverse Scattering.

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Editorial Review

Review
I fully agree with the author that a deeper understanding of Maxwell's equations comes with manipulating the equations numerically...I can see how the text can be used as the basis of a university course, but more importantly I see the book as a shelf reference item for the practicing engineer...Dr. Warnick definitely keeps the promise of matching the complexity of Maxwell's equations to the presented coding problem...I like the illustrative dealing with various EM problems in 1-, 2- and 3-dimensions. The details of numerical differentiation, leading to edge conditions, and the integration methods are complete, clear, and very important...I found the Chapter end problems challenging and important to the understanding of the material...In summary, this well written text serves as an excellent introduction to Matlab and is a very good reference on basic code writing and debugging. The descriptions of computational techniques are valuable. -- Kai Siwiak, Time Derivative, Inc.

From the Back Cover
Key Features

Introduction to basic methods and concepts of numerical analysis
Fundamental numerical tools such as differentiation, integration, specialized to CEM applications.
2D and 3D treatments of finite difference time domain, integral equations, and finite element method.
Accessible treatment targeted to students with as little as one semester of prior EM course experience.
Overview of accuracy and performance analysis for key algorithms.
Programmed sequence of MATLAB code homework projects that build from simple tools to full scale codes. Students will move from basic programming problems that teach MATLAB skills to more complex algorithm implementations.

About the Author
Karl F. Warnick received the B.S. degree (magna cum laude) with University Honors and the Ph.D. degree from Brigham Young University (BYU), Provo, UT, in 1994 and 1997, respectively. Since 2000, he has been a faculty member in the Department of Electrical and Computer Engineering at BYU, where he is currently an Associate Professor. He was a recipient of the National Science Foundation Graduate Research Fellowship, Outstanding Faculty Member award for Electrical and Computer Engineering (2005), the BYU Young Scholar Award (2007), and an honorary Guest Professorship at Nanjing University of Science and Technology. In 2005 and 2007, he was a Visiting Professor at the Technische Universität München, Germany. Dr. Warnick has published many scientific articles and conference papers on electromagnetic theory, numerical methods, remote sensing, antenna applications, phased arrays, biomedical devices, and inverse scattering, and is the author of the books Problem Solving in Electromagnetics, Microwave Circuits, and Antenna Design for Communications Engineering (Artech House, 2006) with Peter Russer and Numerical Analysis for Electromagnetic Integral Equations (Artech House, 2008). He is a Senior Member of the Institute of Electrical and Electronics Engineers, and has served the IEEE Antennas and Propagation Society as a member of the Education Committee and as a session chair and special session organizer for the International Symposium on Antennas and Propagation.

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Amanda Furr:

In this particular era which is the greater man or who has ability in doing something more are more valuable than other. Do you want to become one among it? It is just simple solution to have that. What you need to do is just spending your time not very much but quite enough to have a look at some books. One of the books in the top checklist in your reading list is definitely Numerical Methods for Engineering: An Introduction Using MATLAB and Computational Electromagnetics. This book which can be qualified as The Hungry Inclines can get you closer in growing to be precious person. By looking upwards and review this guide you can get many advantages.

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