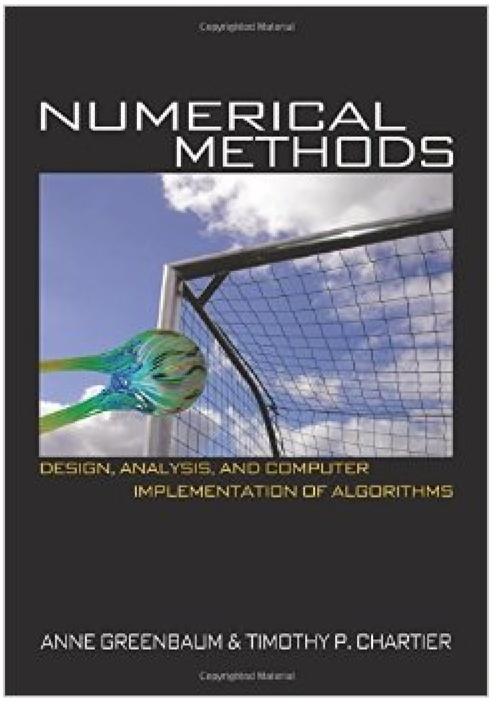
Numerical Methods: Design, Analysis, And Computer Implementation Of Algorithms



Synopsis

Numerical Methods provides a clear and concise exploration of standard numerical analysis topics, as well as nontraditional ones, including mathematical modeling, Monte Carlo methods, Markov chains, and fractals. Filled with appealing examples that will motivate students, the textbook considers modern application areas, such as information retrieval and animation, and classical topics from physics and engineering. Exercises use MATLAB and promote understanding of computational results. The book gives instructors the flexibility to emphasize different aspects--design, analysis, or computer implementation--of numerical algorithms, depending on the background and interests of students. Designed for upper-division undergraduates in mathematics or computer science classes, the textbook assumes that students have prior knowledge of linear algebra and calculus, although these topics are reviewed in the text. Short discussions of the history of numerical methods are interspersed throughout the chapters. The book also includes polynomial interpolation at Chebyshev points, use of the MATLAB package Chebfun, and a section on the fast Fourier transform. Supplementary materials are available online. Clear and concise exposition of standard numerical analysis topics Explores nontraditional topics, such as mathematical modeling and Monte Carlo methods Covers modern applications, including information retrieval and animation, and classical applications from physics and engineering Promotes understanding of computational results through MATLAB exercises Provides flexibility so instructors can emphasize mathematical or applied/computational aspects of numerical methods or a combination Includes recent results on polynomial interpolation at Chebyshev points and use of the MATLAB package Chebfun Short discussions of the history of numerical methods interspersed throughout Supplementary materials available online

Book Information

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Customer Reviews

I teach computers to do math, so-- disclaimer-- I'm on the applied, not pure math side of NA. I came across this text while compiling a Body of Knowledge entry on Spectral, Fourier and Chebyshev methods for IEEE and the International Association of Bodies of Knowledge (The 9bok dot org people who certify math BoKs). The usual "track" for advanced undergrads is Calc up to PDE's, some linear algebra, a little computer arithmetic (and maybe some of my field, Computer Algebra), then on to Engineering or Physics.Along the way, most of us will touch Numerical Analysis. There are two distinct sides to NA-- pure, as a way of defining formal proofs with "results" as much as methods, and applied-- solving problems, especially using algorithms, via close approximation, guessing, brute force, iteration, and other "cheats." The problem with many of the classic NA texts is that "applied" usually means, you guessed it, physics and engineering. Today, however, NA is as much at home with digital artists, game programmers creating physics engines, animators, Maya programmers, etc. as with physicists!You'd think with that going on, there would be some rocking texts that are also fun. Not the case. Sadly, most of the "better" (read understandable) texts in NA date back to the late 1980s, when there was no internet (there were 50 websites in 1992 when Clinton took office). In fact, this author's book on Iterative Linear methods dates back to 1987, and John Boyd's classic on Fourier Spectrals to 1989.This text changes a lot of that! The authors use a LOT more current examples you're likely to find in many other fields, from protein folding to NASCAR. Who uses computers to "guess" at difficult PDE solutions other than astrophysicists?

I am an undergraduate student in Applied Mathematics who just used this text in a course on Numerical Analysis in one of the last courses I'm taking before moving on to grad school for Computer Science.As a previous reviewer noted, this text really goes out of its way to motivate the reader with a bit of a firehose approach to introducing all the different ways in which this material can be applied to computing problems, from graphics processing to machining to airfoil simulation to web search. This field of study may have been developed centuries ago largely by astrophysicists, but the application goes way beyond that with the widespread availability of computers and their ability to implement algorithms that involve too many steps to complete by hand.

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Techniques for Direct and Large-Eddy Simulations (Chapman & Hall/CRC Numerical Analysis and Scientific Computing Series) Stochastic Models, Information Theory, and Lie Groups, Volume 2: Analytic Methods and Modern Applications (Applied and Numerical Harmonic Analysis) An Introduction to Numerical Methods and Analysis Numerical Analysis for Engineers: Methods and Applications, Second Edition (Textbooks in Mathematics) HACKING: Beginner's Crash Course - Essential Guide to Practical: Computer Hacking, Hacking for Beginners, & Penetration Testing (Computer Systems, Computer Programming, Computer Science Book 1) Analog Methods for Computer-Aided Circuit Analysis and Diagnosis (Electrical and Computer Engineering) Memory Management Algorithms And Implementation In C/C++ (Windows Programming/Development) Digital Processing of Synthetic Aperture Radar Data: Algorithms and Implementation [With CDROM] (Artech House Remote Sensing Library) Algorithms: C++: Data Structures, Automation & Problem Solving, w/ Programming & Design (app design, app development, web development, web design, jquery, ... software engineering, r programming) FORTRAN 77 and Numerical Methods for Engineers and Scientists Traffic Flow Theory: Characteristics, Experimental Methods, and Numerical Techniques Partial Differential Equations: Analytical and Numerical Methods, Second Edition Numerical Methods for Scientists and Engineers (Dover Books on Mathematics) Riemann Solvers and Numerical Methods for Fluid Dynamics: A Practical Introduction A First Course in Numerical Methods (Computational Science and Engineering) A Student's Guide to Numerical Methods Numerical Partial Differential Equations: Finite Difference Methods (Texts in Applied Mathematics) Numerical Methods for Fluid Dynamics: With Applications to Geophysics (Texts in Applied Mathematics) Numerical Methods for Engineers