

Categories › Science and Math › Math › Numerical Analysis

# 36 Best Numerical Analysis eBooks of All Time

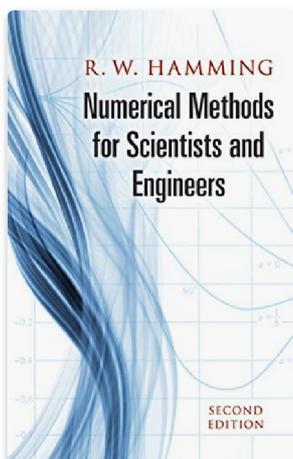
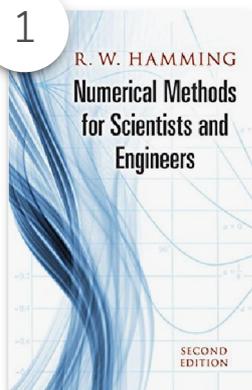
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Recommendations by [Bret Victor](#)



1



## Numerical Methods for Scientists and Engineers (Kindle Edition)

Richard W. Hamming (You?) |

★★★★★ 4.54

Numerical analysis is a subject of extreme interest to mathematicians and computer scientists, who will welcome this first inexpensive paperback edition of a groundbreaking classic text on the subject. In an introductory chapter on numerical methods and their relevance to computing, well-known mathematician Richard Hamming ("the Hamming code," "the Hamming distance," and "Hamming window," etc.), suggests that the purpose of computing is insight, not merely numbers. [...more](#)



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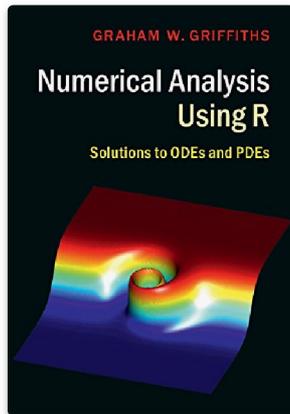
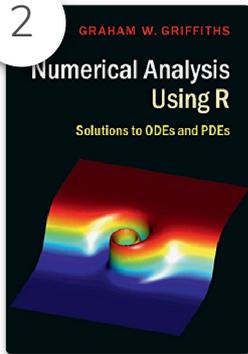


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2



## Numerical Analysis Using R Solutions to ODEs and PDEs (Kindle Edition)

Graham W. Griffiths (You?) | 2016 |

★★★★★ 4.54

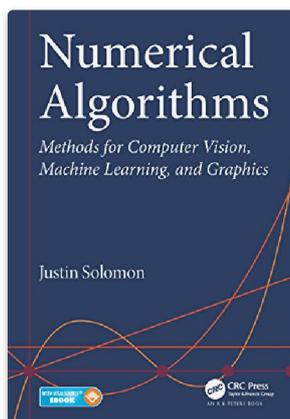
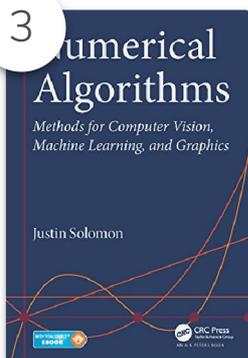
This book presents the latest numerical solutions to initial value problems and boundary value problems described by ODEs and PDEs. The author offers practical methods that can be adapted to solve wide ranges of problems and illustrates them in the increasingly popular open source computer language R, allowing integration with more statistically based methods. The book begins with standard techniques, followed by an overview of 'high resolution' flux limiters and WENO to solve problems with solutions exhibiting high gradient phenomena. [...more](#)

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3



## Numerical Algorithms Methods for Computer Vision, Machine Learning, and Graphics (Kindle Edition)

Justin Solomon (You?) | 2015 |

★★★★★ 4.52

Numerical Algorithms: Methods for Computer Vision, Machine Learning, and Graphics presents a new approach to numerical analysis for modern computer scientists. Using examples from a broad base of computational tasks, including data processing, computational photography, and animation, the textbook introduces numerical modeling and algorithmic design from a practical standpoint and provides insight into the theoretical tools needed to support these skills

The book covers a wide range of topics—from numerical linear

algebra to optimization and differential equations—focusing on real-world motivation and unifying themes. ...more

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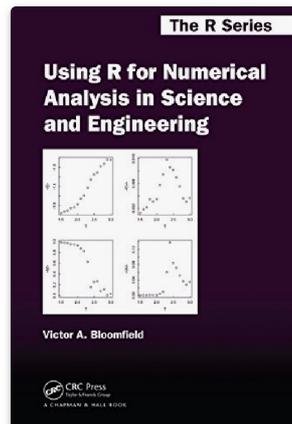
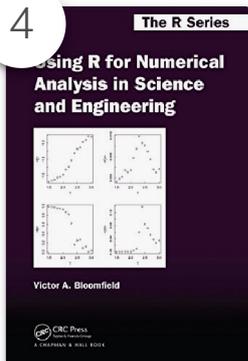
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See also: [Algorithms](#), [Computer Vision](#)

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4



## Using R for Numerical Analysis in Science and Engineering (Kindle Edition)

Victor A. Bloomfield (You?) | 2014 |

★★★★★ 4.49

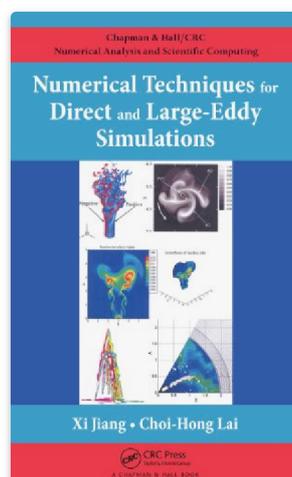
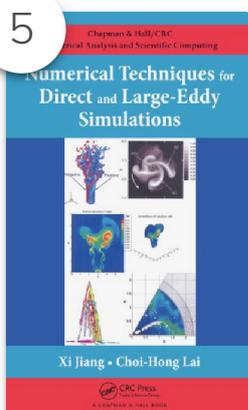
Instead of presenting the standard theoretical treatments that underlie the various numerical methods used by scientists and engineers, *Using R for Numerical Analysis in Science and Engineering* shows how to use R and its add-on packages to obtain numerical solutions to the complex mathematical problems commonly faced by scientists and engineers. ...more

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## Numerical Techniques for Direct and Large-Eddy Simulations (Kindle Edition)

Xi Jiang, Choi-Hong Lai (You?) | 2009 |

★★★★★ 4.48

Compared to the traditional modeling of computational fluid

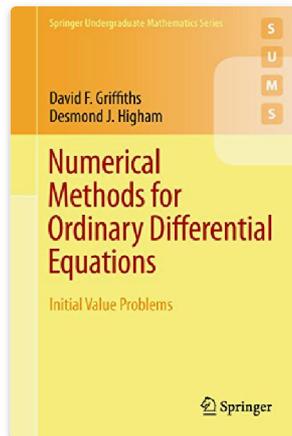
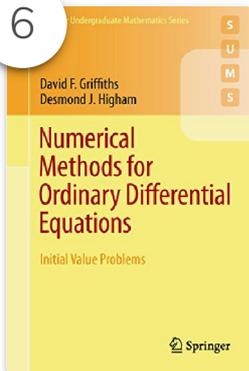
dynamics, direct numerical simulation (DNS) and large-eddy simulation (LES) provide a very detailed solution of the flow field by offering enhanced capability in predicting the unsteady features of the flow field. In many cases, DNS can obtain results that are impossible using any other means while LES can be

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6



## Numerical Methods for Ordinary Differential Equations

Initial Value Problems (Kindle Edition)

David F. Griffiths, Desmond J. Higham

(You?)

| 2010 | ★★★★★ 4.48

Numerical Methods for Ordinary Differential Equations is a self-contained introduction to a fundamental field of numerical analysis and scientific computation. Written for undergraduate students with a mathematical background, this book focuses on the analysis of numerical methods without losing sight of the practical nature of the subject

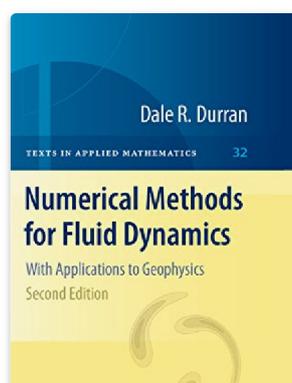
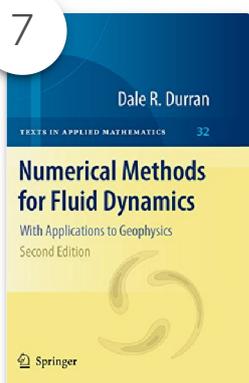
It covers the topics traditionally treated in a first course, but also highlights new and emerging themes. Chapters are broken down into 'lecture' sized pieces, motivated and illustrated by numerous theoretical and computational examples ...more

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## Numerical Methods for Fluid Dynamics

With Applications to Geophysics (Kindle Edition)

Dale R. Durran (You?) | 2010 |

★★★★★ 4.48

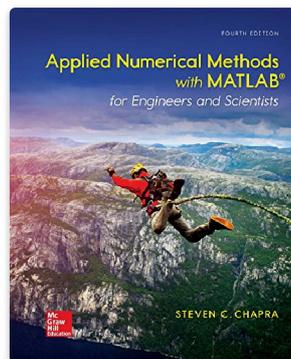
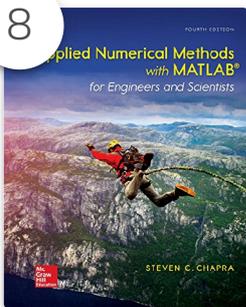
This scholarly text provides an introduction to the numerical methods used to model partial differential equations, with focus on atmospheric and oceanic flows. The book covers both the essentials of building a numerical model and the more sophisticated techniques that are now available. Finite difference methods, spectral methods, finite element method, flux-corrected methods and TVC schemes are all discussed. Throughout, the author keeps to a middle ground between the theorem-proof formalism of a mathematical text and the highly empirical approach found in some engineering publications. [...more](#)

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8



## Applied Numerical Methods with MATLAB for Engineers and Scientists (Kindle Edition)

Steven C. Chapra Dr. (You?) | 2017 | [★★★★☆ 4.41](#)

Applied Numerical Methods with MATLAB is written for students who want to learn and apply numerical methods in order to solve problems in engineering and science. As such, the methods are motivated by problems rather than by mathematics. That said, sufficient theory is provided so that students come away with insight into the techniques and their shortcomings. McGraw-Hill Education's Connect, is also available as an optional, add on item. [...more](#)

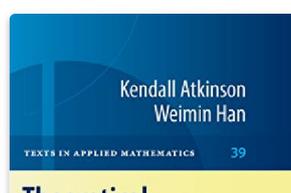
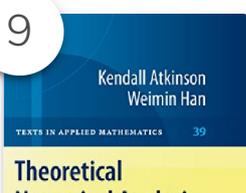
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See also: [Matlab](#)

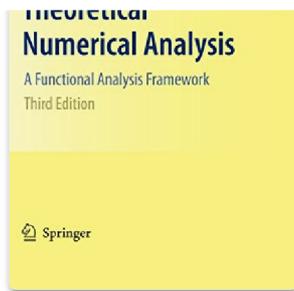
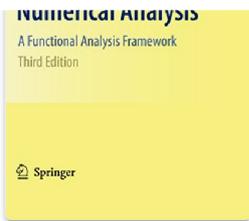
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## Theoretical Numerical Analysis



## A Functional Analysis Framework

Kendall Atkinson, Weimin Han (You?)

| 2009 | ★★★★★ 4.41

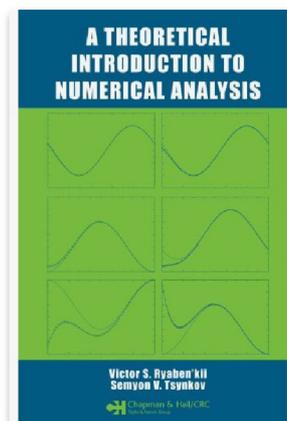
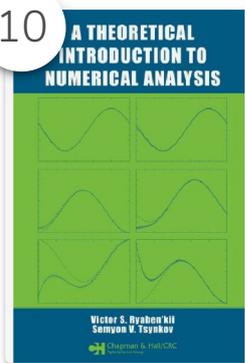
This textbook prepares graduate students for research in numerical analysis/computational mathematics by giving to them a mathematical framework embedded in functional analysis and focused on numerical analysis. This helps the student to move rapidly into a research program. [...more](#)

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10



## A Theoretical Introduction to Numerical Analysis

(Kindle Edition)

Victor S. Ryaben'kii, Semyon V. Tsynkov

(You?)

| 2006 | ★★★★★ 4.41

A Theoretical Introduction to Numerical Analysis presents the general methodology and principles of numerical analysis, illustrating these concepts using numerical methods from real analysis, linear algebra, and differential equations. The book focuses on how to efficiently represent mathematical models for computer-based study. An accessible yet rigorous mathematical introduction, this book provides a pedagogical account of the fundamentals of numerical analysis. The authors thoroughly explain basic concepts, such as discretization, error, efficiency, complexity, numerical stability, consistency, and convergence. [...more](#)

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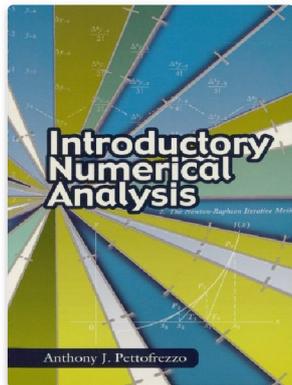
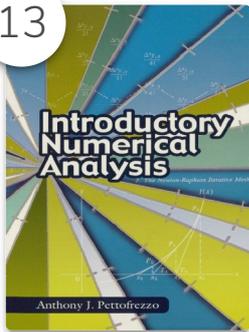
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13



## Introductory Numerical Analysis

(Kindle Edition)

Anthony J. Pettofrezzo, Mathematics  
(You?)

| 2006 | ★★★★★ 4.39

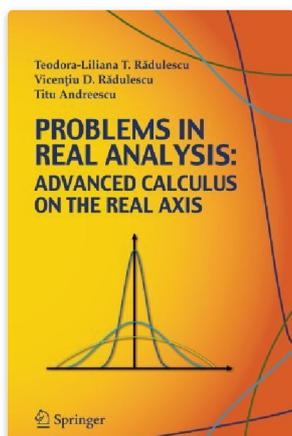
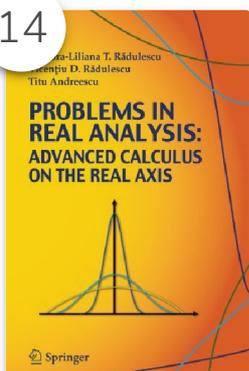
Geared toward undergraduate mathematics majors, engineering students, and future high school mathematics teachers, this text offers an understanding of the principles involved in numerical analysis. Its main theme is interpolation from the standpoint of finite differences, least squares theory, and harmonic analysis. Additional considerations include the numerical solutions of ordinary differential equations and approximations through Fourier series. Discussions of the relationships between the calculus of finite differences and the calculus of infinitesimals will prove especially important to future teachers of mathematics. ...more

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## Problems in Real Analysis Advanced Calculus on the Real Axis (Kindle Edition)

Teodora-Liliana Radulescu, Vicențiu D.  
Radulescu, Titu Andreescu (You?)

| 2009 | ★★★★★ 4.39

Problems in Real Analysis: Advanced Calculus on the Real Axis features a comprehensive collection of challenging problems in mathematical analysis that aim to promote creative, non-standard techniques for solving problems. This self-contained text offers a host of new mathematical tools and strategies which develop a connection between analysis and other mathematical disciplines, such as physics and engineering. A broad view of mathematics is

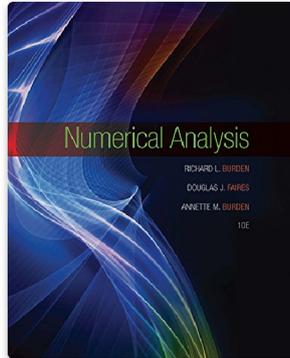
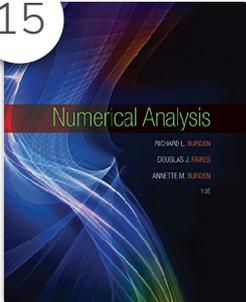
presented throughout; the text is excellent for the classroom or

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## Numerical Analysis (Kindle Edition)

Richard L. Burden, J. Douglas Faires,  
Annette M. Burden (You?)

| 2015 |  4.36

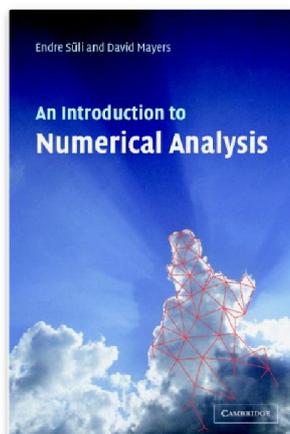
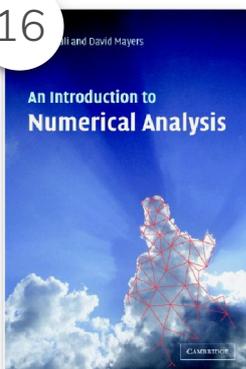
This well-respected book introduces readers to the theory and application of modern numerical approximation techniques. Providing an accessible treatment that only requires a calculus prerequisite, the authors explain how, why, and when approximation techniques can be expected to work-and why, in some situations, they fail. A wealth of examples and exercises develop readers' intuition, and demonstrate the subject's practical applications to important everyday problems in math, computing, engineering, and physical science disciplines. [...more](#)

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## An Introduction to Numerical Analysis (Kindle Edition)

Endre Süli, David F. Mayers (You?)

| 2003 |  4.33

This textbook is written primarily for undergraduate mathematicians and also appeals to students working at an advanced level in other disciplines. The text begins with a clear motivation for the study of numerical analysis based on real-world problems. The authors then develop the necessary machinery

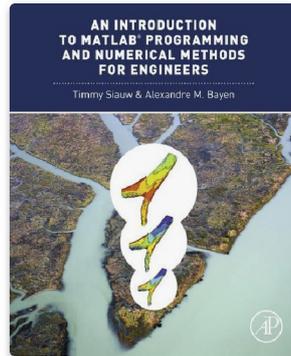
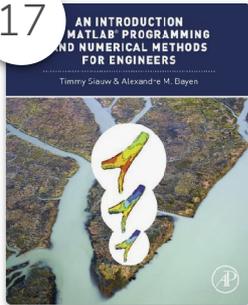
including iteration, interpolation, boundary-value problems and finite elements. Throughout, the authors keep an eye on the analytical basis for the work and add historical notes on the development of the subject. There are numerous exercises for students. ...more

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## An Introduction to MATLAB® Programming and Numerical Methods for Engineers (Kindle Edition)

Timmy Siau, Alexandre Bayen (You?)  
| 2014 |  4.33

Assuming no prior background in linear algebra or real analysis, An Introduction to MATLAB® Programming and Numerical Methods for Engineers enables you to develop good computational problem solving techniques through the use of numerical methods and the MATLAB® programming environment. Part One introduces fundamental programming concepts, using simple examples to put new concepts quickly into practice. Part Two covers the fundamentals of algorithms and numerical analysis at a level allowing you to quickly apply results in practical settings. ...more

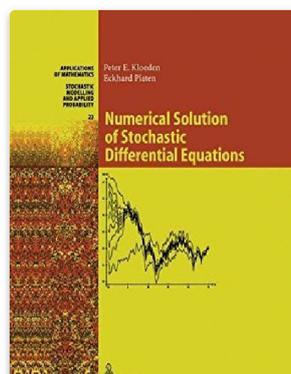
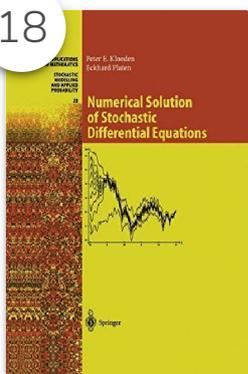
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## Numerical Solution of Stochastic Differential Equations (Kindle Edition)

Peter E. Kloeden, Eckhard Platen (You?)  
|  4.31



The numerical analysis of stochastic differential equations (SDEs) differs significantly from that of ordinary differential equations. This book provides an easily accessible introduction to SDEs, their applications and the numerical methods to solve such equations  
From the reviews:

"The authors draw upon their own research and experiences in obviously many disciplines... considerable time has obviously been spent writing this in the simplest language possible." -- ZAMP [...more](#)



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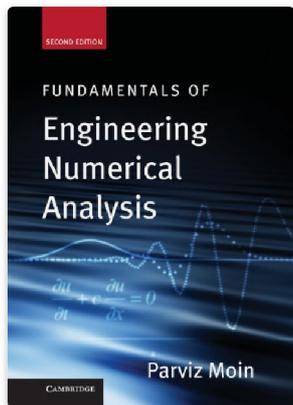
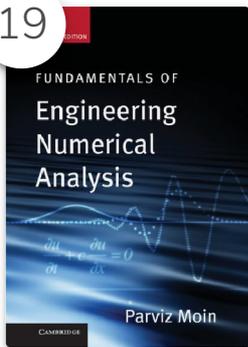


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19



## Fundamentals of Engineering Numerical Analysis

(Kindle Edition)

Parviz Moin (You?) | 2010 |

★★★★★ 4.26

Since the original publication of this book, available computer power has increased greatly. Today, scientific computing is playing an ever more prominent role as a tool in scientific discovery and engineering analysis. In this second edition, the key addition is an introduction to the finite element method. This is a widely used technique for solving partial differential equations (PDEs) in complex domains. This text introduces numerical methods and shows how to develop, analyze, and use them. Complete MATLAB programs for all the worked examples are now available at [www.cambridge](http://www.cambridge). [...more](#)



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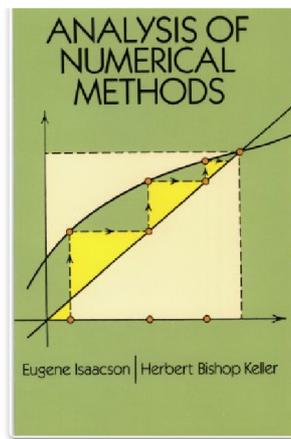
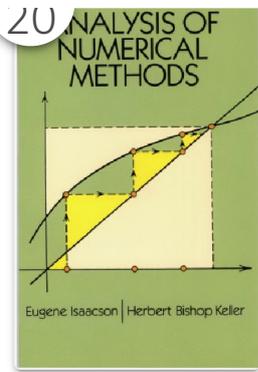
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## Analysis of Numerical Methods

(Kindle Edition)

Eugene Isaacson, Herbert B. Keller (You?)

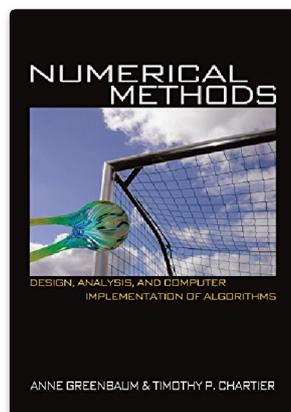
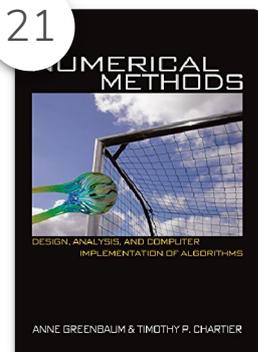
| 1966 | ★★★★★ 4.2

In this age of omnipresent digital computers and their capacity for implementing numerical methods, no applied mathematician, physical scientist, or engineer can be considered properly trained without some understanding of those methods. This text, suitable for advanced undergraduate and graduate-level courses, supplies the required knowledge — not just by listing and describing methods, but by analyzing them carefully and stressing techniques for developing new methods. [...more](#)

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## Numerical Methods

Design, Analysis, and Computer Implementation of Algorithms (Kindle Edition)

Anne Greenbaum, Timothy P. Chartier (You?)

| 2012 | ★★★★★ 4.18

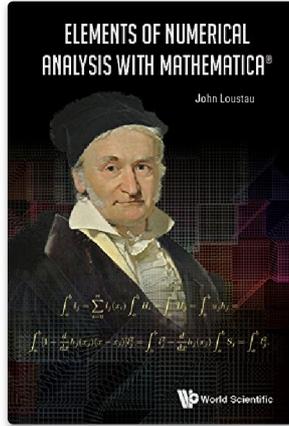
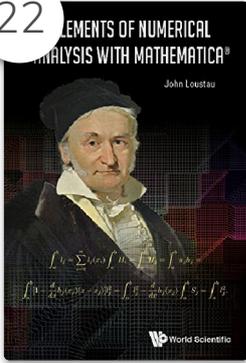
Numerical Methods provides a clear and concise exploration of standard numerical analysis topics, as well as nontraditional ones, including mathematical modeling, Monte Carlo methods, Markov chains, and fractals. Filled with appealing examples that will motivate students, the textbook considers modern application areas, such as information retrieval and animation, and classical topics from physics and engineering. Exercises use MATLAB and promote understanding of computational results [...more](#)

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## Elements of Numerical Analysis with Mathematica (Kindle Edition)

John Loustau (You?) | 2017 |

★★★★★ 4.16

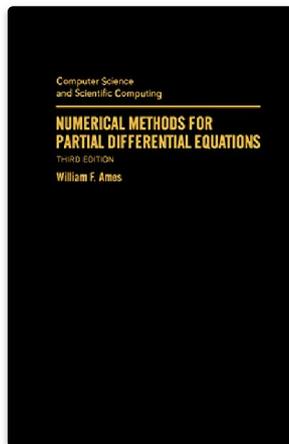
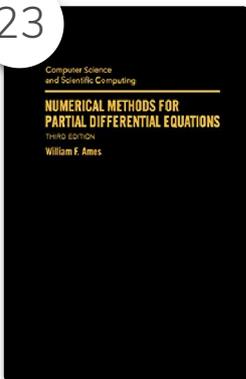
Here we present numerical analysis to advanced undergraduate and master degree level grad students. This is to be done in one semester. The programming language is Mathematica. The mathematical foundation and technique is included. The emphasis is geared toward the two major developing areas of applied mathematics, mathematical finance and mathematical biology. Readership: Undergraduate and master students. ...more

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## Numerical Methods for Partial Differential Equations, Third Edition (Kindle Edition)

William F. Ames (You?) | 1992 |

★★★★★ 4.16

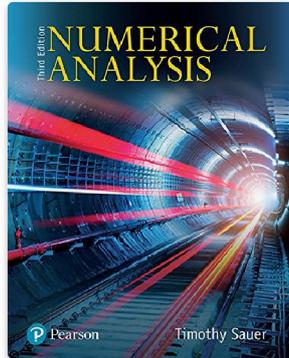
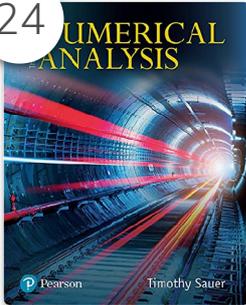
This volume is designed as an introduction to the concepts of modern numerical analysis as they apply to partial differential equations. The book contains many practical problems and their solutions, but at the same time, strives to expose the pitfalls--such as overstability, consistency requirements, and the danger of extrapolation to nonlinear problems methods used on linear problems. Numerical Methods for Partial Differential Equations, Third Edition reflects the great accomplishments that have taken place in scientific computation in the fifteen years since the Second Edition was published. ...more

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## Numerical Analysis (Kindle Edition)

Timothy Sauer (You?) | 2017 |  
★★★★★ 4.14

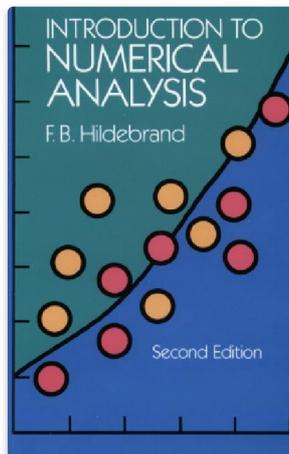
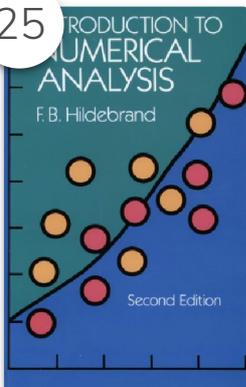
For courses in Numerical Analysis  
Helps students construct and explore algorithms for solving science and engineering problems  
Numerical Analysis, 3rd Edition is for students of engineering, science, mathematics, and computer science who have completed elementary calculus and matrix algebra. It covers both standard topics and some of the more advanced numerical methods used by computational scientists and engineers, while remaining readable and relevant for undergraduates  
Sauer discusses the fundamental concepts of numerical analysis: convergence, complexity, conditioning, compression, and orthogonality. ...more

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## Introduction to Numerical Analysis (Kindle Edition)

Francis Begnaud Hildebrand (You?)  
| 1974 | ★★★★★ 4.14

The ultimate aim of the field of numerical analysis is to provide convenient methods for obtaining useful solutions to mathematical problems and for extracting useful information from

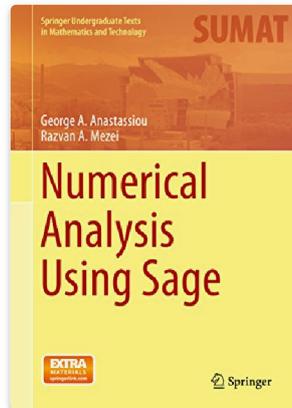
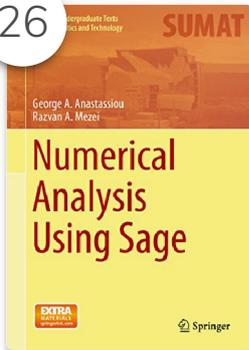
available solutions which are not expressed in tractable forms.

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## Numerical Analysis Using Sage

(Kindle Edition)

George A. Anastassiou, Razvan A. Mezei (You?)

| 2015 |  4.13

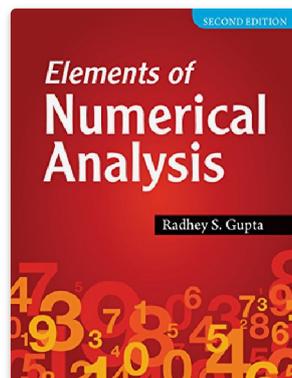
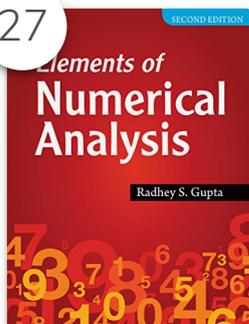
This is the first numerical analysis text to use Sage for the implementation of algorithms and can be used in a one-semester course for undergraduates in mathematics, math education, computer science/information technology, engineering, and physical sciences. The primary aim of this text is to simplify understanding of the theories and ideas from a numerical analysis/numerical methods course via a modern programming language like Sage. Aside from the presentation of fundamental theoretical notions of numerical analysis throughout the text, each chapter concludes with several exercises that are oriented to real-world application. [...more](#)

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## Elements of Numerical Analysis

(Kindle Edition)

Radhey S. Gupta (You?) | 2015 |

 4.13

Numerical Analysis deals with manipulation of numbers to solve a particular problem. This book discusses in detail the creation, analysis and implementation of algorithms to solve the problems

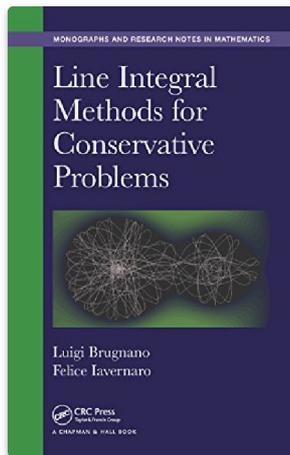
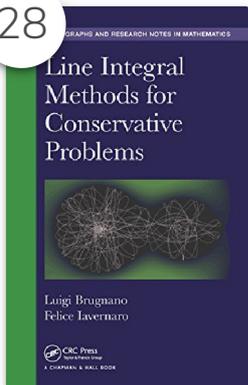
of continuous mathematics. An input is provided in form of numerical data or it is generated as required by the system to solve a mathematical problem. Subsequently this input is processed through arithmetic operations together with logical operations in a systematic manner and output is produced in the

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## Line Integral Methods for Conservative Problems (Kindle Edition)

Luigi Brugnano, Felice Iavernaro (You?)  
| 2015 |  4.13

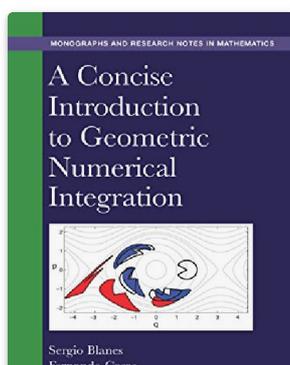
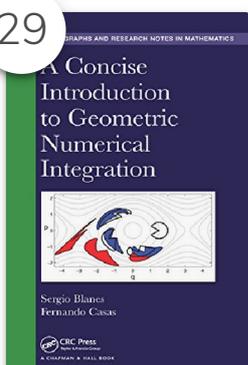
Line Integral Methods for Conservative Problems explains the numerical solution of differential equations within the framework of geometric integration, a branch of numerical analysis that devises numerical methods able to reproduce (in the discrete solution) relevant geometric properties of the continuous vector field. The book focuses on a large set of differential systems named conservative problems, particularly Hamiltonian systems. Assuming only basic knowledge of numerical quadrature and Runge–Kutta methods, this self-contained book begins with an introduction to the line integral methods. [...more](#)

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## A Concise Introduction to Geometric Numerical Integration (Kindle Edition)

Sergio Blanes, Fernando Casas (You?)  
| 2016 |  4.13

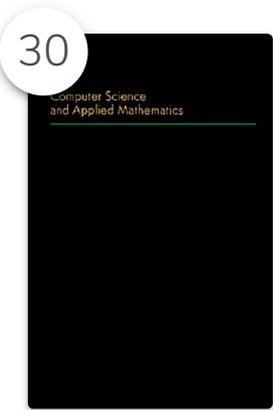


Discover How Geometric Integrators Preserve the Main Qualitative Properties of Continuous Dynamical Systems  
 A Concise Introduction to Geometric Numerical Integration presents the main themes, techniques, and applications of geometric integrators for researchers in mathematics, physics, astronomy, and chemistry who are already familiar with numerical tools for solving differential equations. It also offers a bridge from traditional training in the numerical analysis of differential equations to understanding recent, advanced research literature on numerical geometric integration ...more

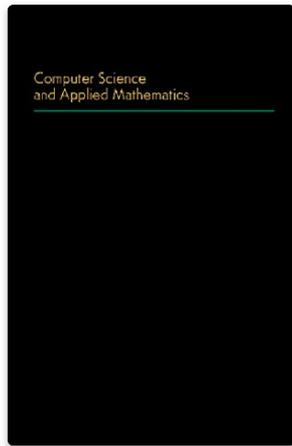
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## Numerical Analysis (Kindle Edition)

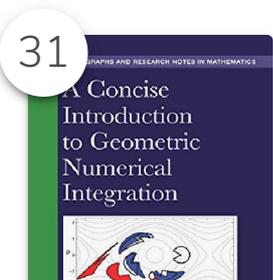
James M. Ortega (You?) |   
 ★★★★★ 4.13

Addresses some of the basic questions in numerical analysis: convergence theorems for iterative methods for both linear and nonlinear equations; discretization error, especially for ordinary differential equations; rounding error analysis; sensitivity of eigenvalues; and solutions of linear equations with respect to changes in the data. ...more

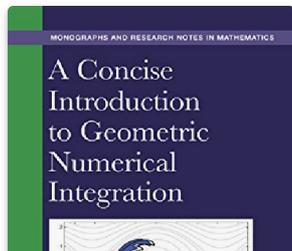
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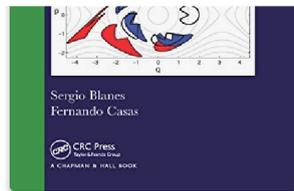
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## A Concise Introduction to Geometric Numerical Integration 2016 Edition (Kindle Edition)



Sergio Blanes Fernando Casas (You?) |

★★★★★ 4.13

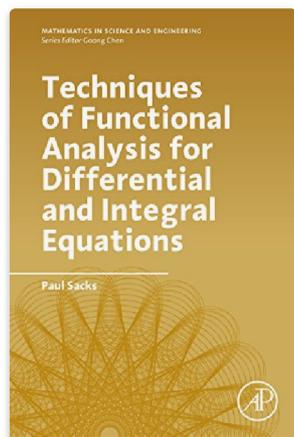
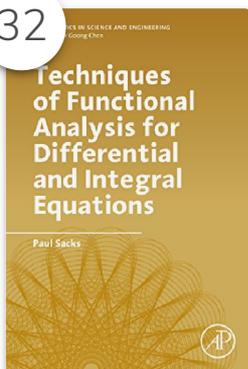
Discover How Geometric Integrators Preserve the Main Qualitative Properties of Continuous Dynamical Systems A Concise Introduction to Geometric Numerical Integration presents the main themes, techniques, and applications of geometric integrators for researchers in mathematics, physics, astronomy, and chemistry who are already familiar with numerical tools for solving differential equations. It also offers a bridge from traditional training in the numerical analysis of differential equations to understanding recent, advanced research literature on numerical geometric integration. [...more](#)

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## Techniques of Functional Analysis for Differential and Integral Equations

(Kindle Edition)

Paul Sacks (You?) | 2017 |

★★★★★ 4.13

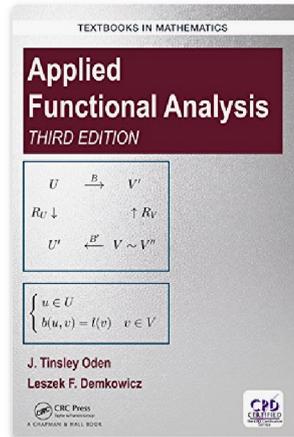
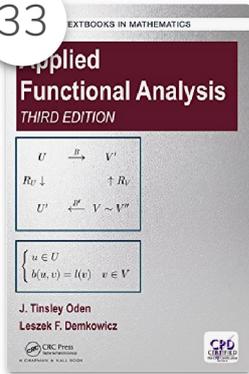
Techniques of Functional Analysis for Differential and Integral Equations describes a variety of powerful and modern tools from mathematical analysis, for graduate study and further research in ordinary differential equations, integral equations and partial differential equations. Knowledge of these techniques is particularly useful as preparation for graduate courses and PhD research in differential equations and numerical analysis, and more specialized topics such as fluid dynamics and control theory. [...more](#)

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## Applied Functional Analysis (Kindle Edition)

J. Tinsley Oden, Leszek Demkowicz

(You?)

| 2018 | ★★★★★ 4.13

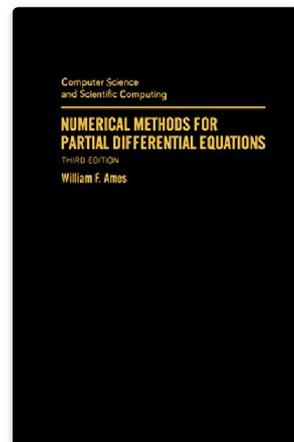
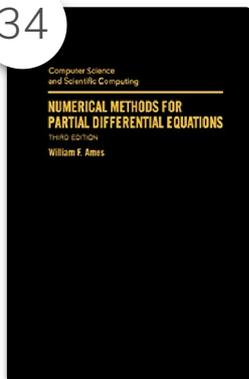
Applied Functional Analysis, Third Edition provides a solid mathematical foundation for the subject. It motivates students to study functional analysis by providing many contemporary applications and examples drawn from mechanics and science. This well-received textbook starts with a thorough introduction to modern mathematics before continuing with detailed coverage of linear algebra, Lebesgue measure and integration theory, plus topology with metric spaces ...[more](#)

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## Numerical Methods For Partial Differential Equations (Kindle Edition)

William F Ames (You?) | 1977 |

★★★★★ 4.13

This volume is designed as an introduction to the concepts of modern numerical analysis as they apply to partial differential equations. The book contains many practical problems and their solutions, but at the same time, strives to expose the pitfalls--such as overstability, consistency requirements, and the danger of extrapolation to nonlinear problems methods used on linear problems. Numerical Methods for Partial Differential Equations, Third Edition reflects the great accomplishments that have taken place in scientific computation in the fifteen years since the Second Edition was published. ...[more](#)



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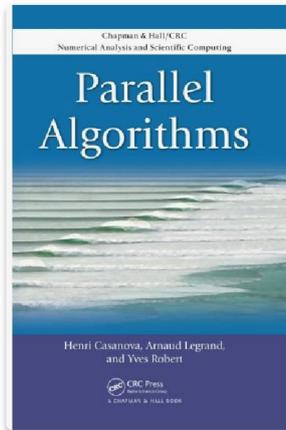
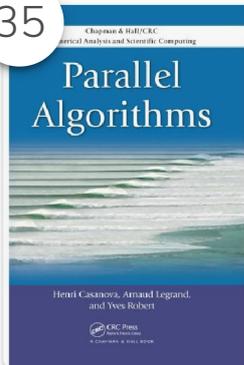


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## Parallel Algorithms (Kindle Edition)

Henri Casanova, Arnaud Legrand, Yves Robert (You?)

| 2008 | ★★★★★ 4.13

Focusing on algorithms for distributed-memory parallel architectures, *Parallel Algorithms* presents a rigorous yet accessible treatment of theoretical models of parallel computation, parallel algorithm design for homogeneous and heterogeneous platforms, complexity and performance analysis, and essential notions of scheduling. The book extracts fundamental ideas and algorithmic principles from the mass of parallel algorithm expertise and practical implementations developed over the last few decades. ...more



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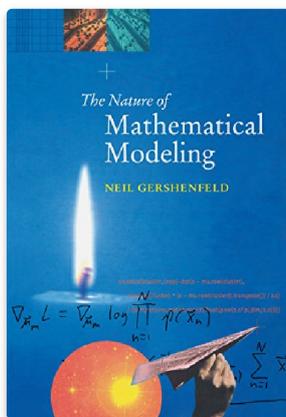
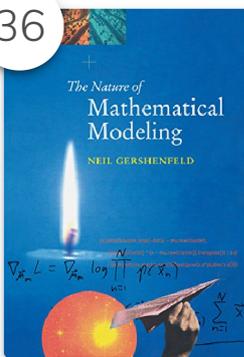


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## The Nature of Mathematical Modeling (Kindle Edition)

Neil Gershenfeld (You?) | 2011 |

★★★★★ 3.76

This book first covers exact and approximate analytical techniques (ordinary differential and difference equations, partial differential equations, variational principles, stochastic processes); numerical methods (finite differences for ODE's and PDE's, finite elements, cellular automata); model inference based on observations

(function fitting, data transforms, network architectures, search techniques, density estimation); as well as the special role of time in modeling (filtering and state estimation, hidden Markov processes, linear and nonlinear time series). [...more](#)



Recommended by [Bret Victor](#)



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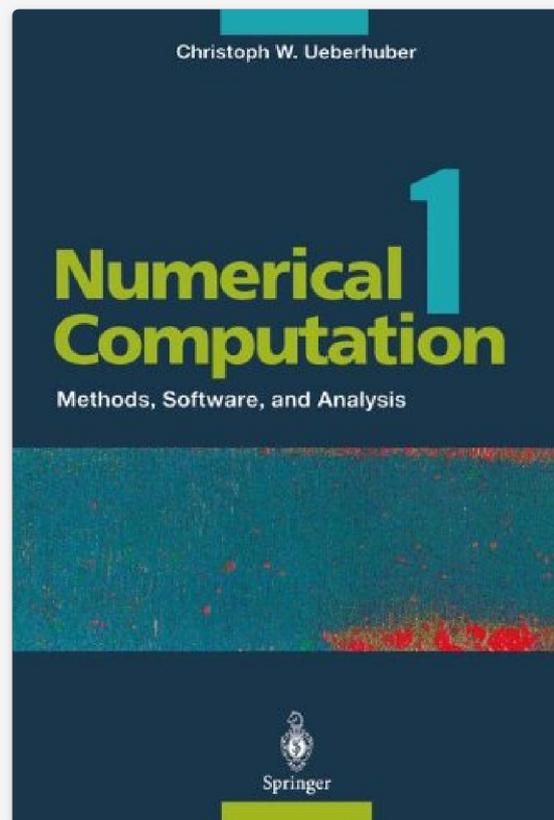
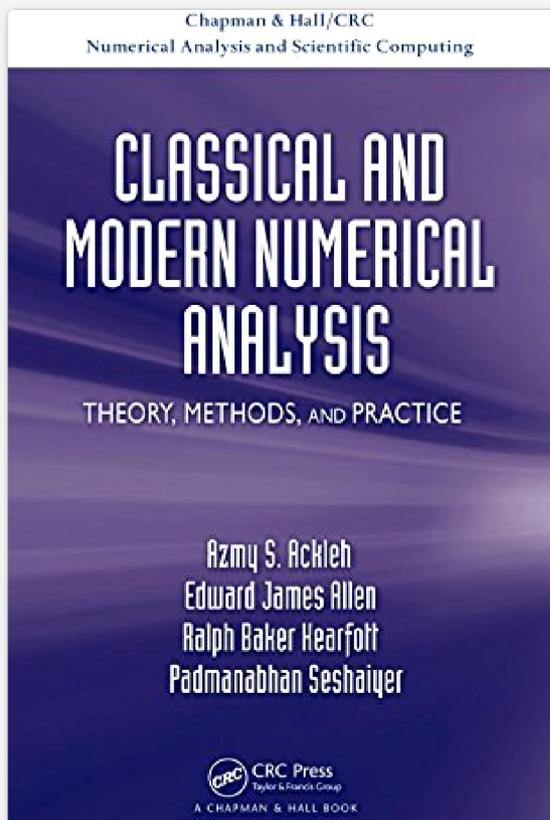


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