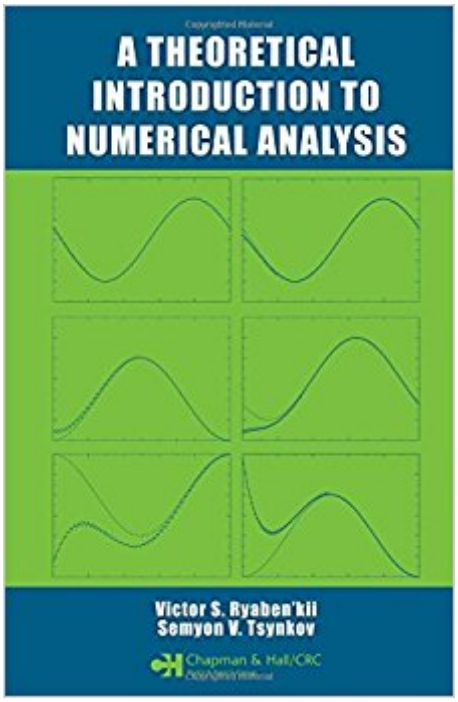
A Theoretical Introduction To Numerical Analysis



Synopsis

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. The text also addresses more complex topics like intrinsic error limits and the effect of smoothness on the accuracy of approximation in the context of Chebyshev interpolation, Gaussian quadratures, and spectral methods for differential equations. Another advanced subject discussed, the method of difference potentials, employs discrete analogues of Calderonâ ™s potentials and boundary projection operators. The authors often delineate various techniques through exercises that require further theoretical study or computer implementation. By lucidly presenting the central mathematical concepts of numerical methods, A Theoretical Introduction to Numerical Analysis provides a foundational link to more specialized computational work in fluid dynamics, acoustics, and electromagnetism.

Book Information

Hardcover: 552 pages
Publisher: Chapman and Hall/CRC; 1 edition (November 2, 2006)
Language: English
ISBN-10: 1584886072
ISBN-13: 978-1584886075
Product Dimensions: 6.5 x 1.3 x 9.3 inches
Shipping Weight: 2 pounds (View shipping rates and policies)
Average Customer Review: 5.0 out of 5 stars 1 customer review
Best Sellers Rank: #599,399 in Books (See Top 100 in Books) #81 inÂ Books > Science & Math > Mathematics > Number Systems #397 inÂ Books > Science & Math > Physics > Mathematical Physics #1054 inÂ Books > Textbooks > Engineering > Mechanical Engineering

Customer Reviews

It is an excellent book, having a wide spectrum of classical and advanced topics. The book has all the advantages of the Russian viewpoint as well as the Western one. -David Gottlieb, Brown University, Providence, Rhode Island, USA

I bought this book by Ryabenkii and Tsynkov long back while teaching a course on Numerical analysis in 2011. At that time, I was following a book by Kincaid and Cheney on Numerical Analysis for my course. However when it comes to Numerical PDEs, this book does not have much details. Hence I was searching books on my rack. I was looking for a book which has theory, and not just numerical problems.I particularly liked the following about Ryabenkii-Tsynkov book:(1) Concepts of Stability, Consistency, Convergence were dealt in the general case. The 'usual books' introduce these notions when they are dealing a particular equation, giving us a feel as though these analyses are done differently for different types of equations.(2) von Neumann stability is also defined in a straight forward manner, and once again introduced as a general tool, and the procedure for applying the same is the same, whatever the equation is.(3) Most importantly, this book reveals secrets (for example, von Neumann condition is not sufficient while dealing with infinity norm) which 'other books' do not highlight. In this context, I would like to say that this book is among the three honest books that I came across: Initially I came across a book by Sanchez entitled "An eclectic tour of ODE", and also his article on "why ODE books tend to be bulky?

and Computational Aerodynamics (Dover Books on Aeronautical Engineering)