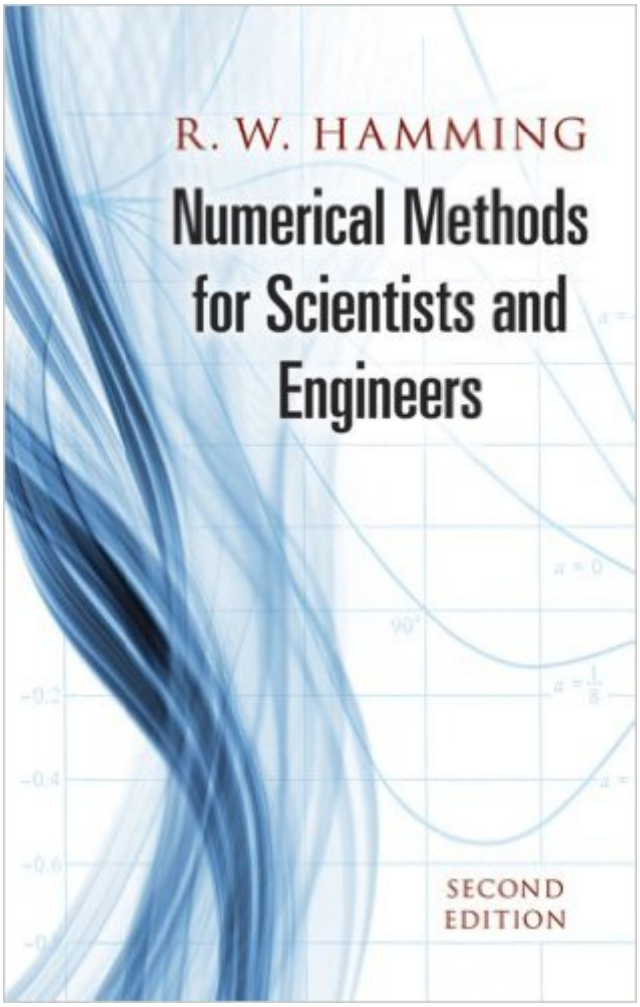
Numerical Methods For Scientists And Engineers (Dover Books On Mathematics)



Synopsis

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. In that connection he outlines five main ideas that aim at producing meaningful numbers that will be read and used, but will also lead to greater understanding of how the choice of a particular formula or algorithm influences not only the computing but our understanding of the results obtained.The five main ideas involve (1) insuring that in computing there is an intimate connection between the source of the problem and the usability of the answers (2) avoiding isolated formulas and algorithms in favor of a systematic study of alternate ways of doing the problem (3) avoidance of roundoff (4) overcoming the problem of truncation error (5) insuring the stability of a feedback system.In this second edition, Professor Hamming (Naval Postgraduate School, Monterey, California) extensively rearranged, rewrote and enlarged the material. Moreover, this book is unique in its emphasis on the frequency approach and its use in the solution of problems. Contents include:I. Fundamentals and AlgorithmsII. Polynomial Approximation- Classical TheoryIII. Fourier Approximation- Modern TheoryIV. Exponential Approximation ... and moreHighly regarded by experts in the field, this is a book with unlimited applications for undergraduate and graduate students of mathematics, science and engineering. Professionals and researchers will find it a valuable reference they will turn to again and again.

Book Information

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Customer Reviews

Throughout the book, that motto is repeated.By reading and absorbing the material in this book, the reader is left with the tools and the insights necessary to derive their own numerical methods.No longer will numerical methods be memorized as textbook formulas -- now the reader can adapt and derive a formula to solve a specific problem, instead of trying to fit one of a small number of textbook formulas to a problem.The distinction is made between numerical analysis and numerical methods, with emphasis on the latter.The book is roughly divided into two parts. The first part covers classical numerical methods, using classical error analysis (truncation error, roundoff error). The second part reexamines these methods under the frequency domain, analyzing how numerical methods affect various frequencies (the "transfer function" approach).Numerical methods are derived under an information theory model, such as by finding a quadrature formula of the highest polynomial degree of accuracy, given limited information about the function and its derivatives.Matrices and linear systems are not discussed as much as one might expect, although one chapter convincingly leads the reader to question some classical methods.The content is well-rounded, introducing many readers to topics such as random number generators, difference equations and summation formulas, digital filters and quantization, discrete fourier transforms and the FFT, and orthogonal polynomials. A background in calculus is all that is needed.Many real-world examples and anecdotes are cited, but without too much detail or too many illustrations given.This book encourages the reader to ask: "What information is available about the problem?

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