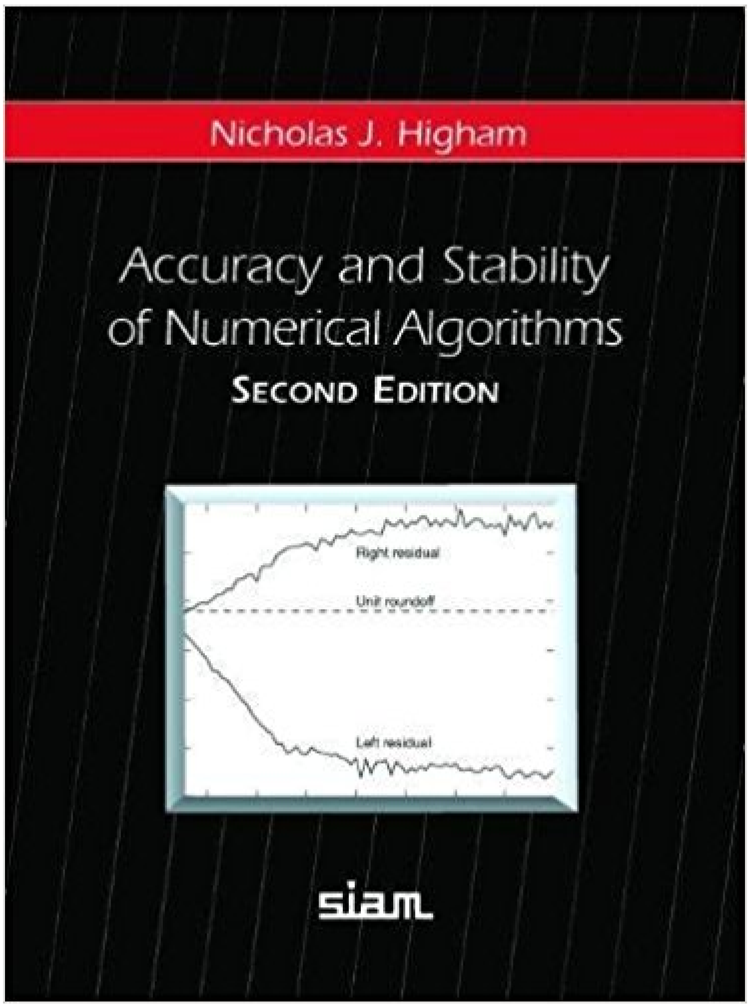
Accuracy And Stability Of Numerical Algorithms



Synopsis

This book gives a thorough, up-to-date treatment of the behaviour of numerical algorithms in finite precision arithmetic. It combines algorithmic derivations, perturbation theory, and rounding error analysis, all enlivened by historical perspective and informative quotations. The coverage of the first edition has been expanded and updated, involving numerous improvements. Two new chapters treat symmetric indefinite systems and skew-symmetric systems, and nonlinear systems and Newton’s method. Twelve new sections include coverage of additional error bounds for Gaussian elimination, rank revealing LU factorizations, weighted and constrained least squares problems, and the fused multiply-add operation found on some modern computer architectures. This new edition is a suitable reference for an advanced course and can also be used at all levels as a supplementary text from which to draw examples, historical perspective, statements of results, and exercises. In addition the thorough indexes and extensive, up-to-date bibliography are in a readily accessible form.

Book Information

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Customer Reviews

’This book is a monumental work on the analysis of rounding error and will serve as a new standard textbook on this subject, especially for linear computation.’ S. Hitotumatu, Mathematical Reviews’...This definitive source on the accuracy and stability of numerical algorithms is quite a bargain and a worthwhile addition to the library of any statistician heavily involved in computing.’ Robert L. Strawderman, Journal of the American Statistical Association’...A monumental book that should be on the bookshelf of anyone engaged in numerics, be it as a specialist or as a user.' A. van der Sluis, ITW Nieuws'This text may become the new 'Bible' about accuracy and stability for the solution of systems of linear equations. It covers 688 pages carefully collected, investigated, and written ... One will find that this book is a very suitable and comprehensive reference for research in numerical linear algebra, software usage and development, and for numerical linear algebra courses.' N. KÃ¶ckler, Zentrallblatt fÃ r Mathematik'... Nick Higham has assembled an enormous amount of important and useful material in a coherent, readable form. His book belongs on the shelf of anyone who has more than a casual interest in rounding error and matrix computations. I hope the author will give us the 600-odd page sequel. But if not, he has more than earned his respite - and our gratitude.' G. W. Stewart, SIAM Review

This book provides a thorough, up-to-date treatment of the behaviour of numerical algorithms in finite precision arithmetic. The coverage of the first edition has been expanded and updated, including numerous improvements to the original material. Its thorough indexes and extensive, up-to-date bibliography are in a readily accessible form.

Higham does a pretty good job of explaining a difficult topic. It's been very helpful overall, but sometimes key equations and derivations are a bit difficult to find. He also doesn't (and probably can't) cover every possible floating point computation - so sometimes you have to find an operation that is similar to one you're working on, pay extremely close attention to his logic and derivation, then use it as a starting point for your own analysis/derivations.

This is an incredibly useful book for anyone who does a significant amount of programming with floating-point math and cares about its accuracy. There's this idea that floating point is not only imprecise -- which it is -- but also inherently opaque and unreliable, which it is NOT. This book will show you how to determine guaranteed, dependable bounds on the precision of your algorithms, and how to keep those bounds as tight as possible.The early chapters build up a set of tools for analyzing and bounding error. Rather than settle on a single method of analysis, the book provides an array of them, ranging from the simple and conservative to the elaborate and exact. Later chapters focus on specific algorithms and use cases, mostly in the context of linear algebra; it assumes basic knowledge of most of these algorithms. This would not be a good book for learning about LU decomposition. But it is a great book for learning how to depend on LU decomposition.It's dense in places, and has an unfortunate historical bent at times. Much ink is spent on the vagaries of the Cray FPU and the HP-48 calculator. Chapter 2, in particular, would have been considerably more readable if the author had stuck to base-2 representations, rather than complicating the math to encompass the rare and ultimately inconsequential base-10 and base-16 systems out there. There's also a certain amount of spaghetti writing... some of the material in the earlier chapters uses results from later chapters, which is particularly unfortunate in a book that's trying to build up a foundation of analysis methods in an ordered manner.But that is a tiny, tiny complaint, in the context of a book which has successfully taken such a complex, scary subject and made it truly approachable for the practical programmer. And given the fundamentally dry nature of the topic, the book is remarkably engaging. One could even call it a FUN READ. Arm yourself with a pad of paper and a compiler: you'll want to take frequent breaks to confirm the sometimes surprising revelations for yourself.

The book was not in good conditions

Accuracy and Stability of Numerical Algorithms Introduction to Aircraft Flight Mechanics: Performance, Static Stability, Dynamic Stability, Classical Feedback Control, and State-Space Foundations (AIAA Education) Biological Modeling and Simulation: A Survey of Practical Models, Algorithms, and Numerical Methods (Computational Molecular Biology) Numerical Methods: Design, Analysis, and Computer Implementation of Algorithms Numerical Algorithms: Methods for Computer Vision, Machine Learning, and Graphics Evolutionary Algorithms in Theory and Practice: Evolution Strategies, Evolutionary Programming, Genetic Algorithms Bundle of Algorithms in C++, Parts 1-5: Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms (3rd Edition) (Pts. 1-5) Practical Algorithms in Pediatric Hematology and Oncology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Practical Algorithms in Pediatric Nephrology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Practical Algorithms in Pediatric Gastroenterology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Practical Algorithms in Pediatric Endocrinology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Practical Predictive Analytics and Decisioning Systems for Medicine: Informatics Accuracy and Cost-Effectiveness for Healthcare Administration and Delivery Including Medical Research Scripture Alone: Exploring the Bible's Accuracy, Authority and Authenticity The Book of Yields: Accuracy in Food Costing and Purchasing Improving Speed and Accuracy in Keyboarding with Software Registration Card Improving Speed and Accuracy in Keyboarding FINALLY: THE GOLF SWING'S SIMPLE SECRET - A revolutionary method proved for the weekend golfer to significantly improve distance and accuracy from day one (1) FINALLY: The Golf SwingÂ´s Simple Secret: A revolutionary method proved for the weekend golfer to significantly improve distance and accuracy from day one Professional Soccer Passing Patterns: Passing Patterns That Develop Technical Ability, Increase Coordination of Player Movements, Establish Timing & Rhythm, Increase Passing Accuracy and Player Focus Life Drawing: How To Portray the Figure with Accuracy and Expression