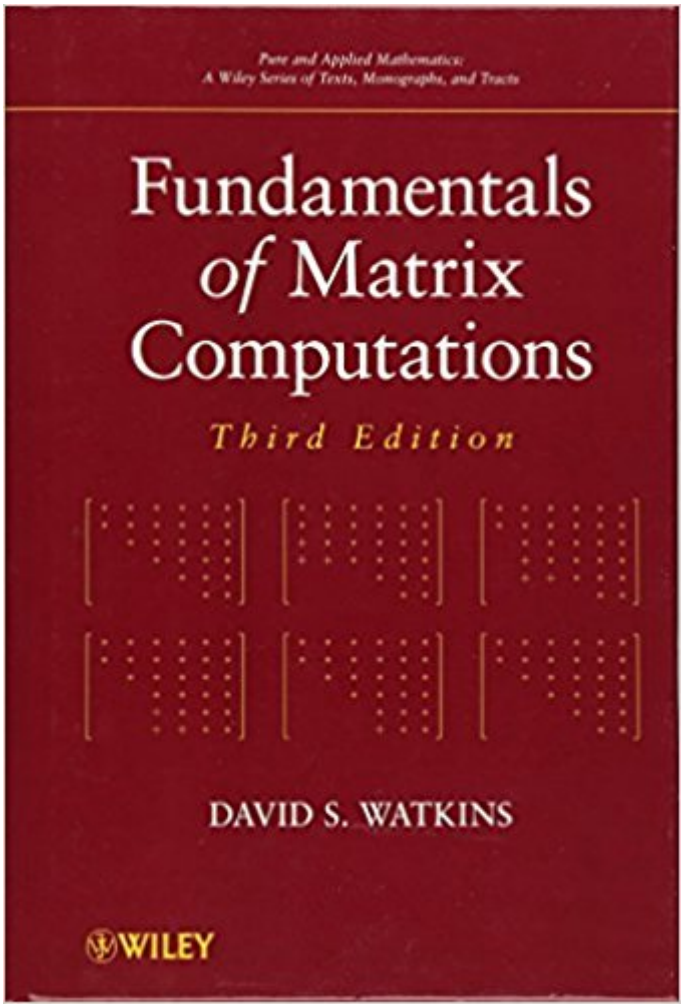
Fundamentals Of Matrix Computations



Synopsis

This new, modernized edition provides a clear and thorough introduction to matrix computations,a key component of scientific computing Retaining the accessible and hands-on style of its predecessor, Fundamentals of Matrix Computations, Third Edition thoroughly details matrix computations and the accompanying theory alongside the author's useful insights. The book presents the most important algorithms of numerical linear algebra and helps readers to understand how the algorithms are developed and why they work. Along with new and updated examples, the Third Edition features: A novel approach to Francis' QR algorithm that explains its properties without reference to the basic QR algorithm Application of classical Gram-Schmidt with reorthogonalization A revised approach to the derivation of the Golub-Reinsch SVD algorithm New coverage on solving product eigenvalue problems Expanded treatment of the Jacobi-Davidson method A new discussion on stopping criteria for iterative methods for solving linear equations Throughout the book, numerous new and updated exercisesÃ¢â ¬â •ranging from routine computations and verifications to challenging programming and proofsÃ¢â ¬â •are provided, allowing readers to immediately engage in applying the presented concepts. The new edition also incorporates MATLAB to solve real-world problems in electrical circuits, mass-spring systems, and simple partial differential equations, and an index of MATLAB terms assists readers with understanding the basic concepts related to the software. Fundamentals of Matrix Computations, Third Edition is an excellent book for courses on matrix computations and applied numerical linear algebra at the upper-undergraduate and graduate level. The book is also a valuable resource for researchers and practitioners working in the fields of engineering and computer science who need to know how to solve problems involving matrix computations.

Book Information

Hardcover: 644 pages
Publisher: Wiley; 3 edition (July 6, 2010)
Language: English
ISBN-10: 0470528338
ISBN-13: 978-0470528334
Product Dimensions: 6.4 x 1.4 x 9.6 inches
Shipping Weight: 2.3 pounds (View shipping rates and policies)
Average Customer Review: 4.7 out of 5 stars 9 customer reviews
Best Sellers Rank: #304,883 in Books (See Top 100 in Books) #18 inÃ Â Books > Science & Math

> Mathematics > Matrices #145 inÃ Â Books > Science & Math > Mathematics > Pure Mathematics > Algebra > Linear #1057 inÃ Â Books > Textbooks > Science & Mathematics > Mathematics > Algebra & Trigonometry

Customer Reviews

The use of numerical methods continues to expand rapidly. At their heart lie matrix computations. Written in a clear, expository style, it allows students and professionals to build confidence in themselves by putting the theory behind matrix computations into practice instantly. Algorithms that allow students to work examples and write programs introduce each chapter. The book then moves on to discuss more complicated theoretical material. Using a step-by-step approach, it introduces mathematical material only as it is needed. Exercises range from routine computations and verifications to extensive programming projects and challenging proofs. --This text refers to an out of print or unavailable edition of this title.

This new, modernized edition provides a clear and thorough introduction to matrix computations, a key component of scientific computing Retaining the accessible and hands-on style of its predecessor, Fundamentals of Matrix Computations, Third Edition thoroughly details matrix computations and the accompanying theory alongside the author’s useful insights. The book presents the most important algorithms of numerical linear algebra and helps readers to understand how the algorithms are developed and why they work. Along with new and updated examples, the Third Edition features: A novel approach to Francis’ QR algorithm that explains its properties without reference to the basic QR algorithm Application of classical Gram-Schmidt with reorthogonalization A revised approach to the derivation of the Golub-Reinsch SVD algorithm New coverage on solving product eigenvalue problems Expanded treatment of the Jacobi-Davidson method A new discussion on stopping criteria for iterative methods for solving linear equations Throughout the book, numerous new and updated exercisesÃ¢â ¬â •ranging from routine computations and verifications to challenging programming and proofsÃ¢â ¬â •are provided, allowing readers to immediately engage in applying the presented concepts. The new edition also incorporates MATLAB to solve real-world problems in electrical circuits, mass-spring systems, and simple partial differential equations, and an index of MATLAB terms assists readers with understanding the basic concepts related to the software. Fundamentals of Matrix Computations, Third Edition is an excellent book for courses on matrix computations and applied numerical linear algebra at the upper-undergraduate and graduate level. The book is also a valuable resource for

researchers and practitioners working in the fields of engineering and computer science who need to know how to solve problems involving matrix computations.

I took a numerical linear algebra course from Dr. Watkins while a graduate student at WSU. We used this as our text. This book is one of the best written and most useful books I own. I still regularly go back to it when I need to work something out. The tone is conversational but precise. The topics flow together very nicely. There is a wonderful spread of different ideas presented... From numerical linear algebra to PDEs and calculus - all of which is applied. Great!Most importantly (as far as I'm concerned), the focus of this text is on actually *doing* the math. There are certainly proofs in this book but there isn't a stupid amount of theory. It is very down to earth. I used Matlab while in school - and am not porting all of the algorithms I wrote for the class into R.Highly recommended!

After looking at a few books on matrix computations I believe that that Fundamentals of Matrix Computations by David S. Watkins does the best job of balancing theory and practice. Being a self learner I found this book easy to read, provided enough practical advice to write high quality algorithms, and provided a good foundation for more advanced subjects. Be sure to at least read through all the exercises since they often cover new material not discussed in the main section. Its worth working through many of the exercises and enough information is provided in general to validate your solution. As a self learner I'm often frustrated with some books that provided exercises but no way to know if you're right or not. I even went on to write a linear algebra library in Java which uses this book as the primary reference for a few of the algorithms, search for EJML if you are curious.Golub and Van Loan's book covers much more material than Watkins but in a much more terse fashion. By terse I don't mean that Golub/Van Loan's is hard to understand, it is a very good book, but it is terse. I tend to use Golub/Van Loan's book more as a reference if I need to look something up quickly or if the material is not covered else where. There are also some situations important details are not mentioned in that book but are mentioned in Watkins' book. I have also looked though Numerical Linear Algebra by Trefethen and Bau. That book provided a good general high level overview of the basic subjects and in few cases was easier to understand, but I found it on the whole lacking in detail and often did not discuss important implementation issues.(This review is for the 2nd Edition. I have yet to look at the 3rd.)

better than listening to some lectures. More examples would be useful

This book does quite the achievement of giving a very clear and rigorous presentation of the Arnoldi and implicitely restarted Arnoldi processes, which are far from being easy to understand. There are enough proofs to understand the theory and a lot of exercices to make you manipulate the concepts. In definitive, this is an excellent book!

I love the format of this book, it explains a topic from the ground up and you understand the roots of the problem and the roots of the solutions. In my case, I was specifically looking for a book covering orthogonal transformations and the fastest way to update existing orthogonal-decompositions e.g. QR. The author does a great job explaining the use cases for employing these transformations and without taking a lot for granted explains from the ground up how they work i.e. very nicely explains Givens rotations and Householder reflectors. This book offers the best introduction to the topic whereas IMO Golub's requires some level of familiarity with the subjects already.I'm working in a High-Performance implementation of an algorithm whose main bottlenecks are related to matrix computations. This book along with Golub's have been by my side since I started the project. I highly recommend it.

when i first saw this book, i was very excited. i would have rated it 5 stars at that time. It's a much easier read than Golub's "matrix computations" and Demmel's "Applied Numerical Linear Algebra".but then I saw Trefethen and Bau's "Numerical Linear Algebra", and I was totally amazed by that book. By comparison, this book by Watkins can only be rated 4 stars. It just doesn't match up to Trefethen's book in terms of elegance, smoothness, intuitiveness, and more importantly, focusing on the essence instead of being buried in the details.if you are really interested in the topic of matrix computation, I suggest you start with Trefethen's book, and use Golub's book as reference later on.

I used this book to learn iterative methods and absolutely loved it. The explanations are clear and the coverage of techniques is very comprehensive. The chapters on SVD (see cover illustration) and eigenvalue decomposition are also very well explained. I found it to be engaging and more approachable for a novice than Golub and van Loan (which by the way, you *should* read after reading Watkins :-))

Concepts are explained lucidly. The exercise problems are interesting. It would be a good idea to

read this book first before moving on to books like the one by Golub/ Van Loan. Useful for self study...

Fundamentals of Matrix Computations Matrix Computations (Johns Hopkins Studies in the Mathematical Sciences) Matrix Algebra: Theory, Computations, and Applications in Statistics (Springer Texts in Statistics) Matrix Computations (Johns Hopkins Studies in Mathematical Sciences)(3rd Edition) Matrix Computations and Semiseparable Matrices: Eigenvalue and Singular Value Methods (Volume 2) Matrix Computations and Semiseparable Matrices: Linear Systems (Volume 1) Advanced Transport Phenomena: Analysis, Modeling, and Computations Adjustment Computations: Spatial Data Analysis Lanczos Algorithms for Large Symmetric Eigenvalue Computations Vol. I Theory (Progress in Scientific Computing) Programming for Computations - Python: A Gentle Introduction to Numerical Simulations with Python (Texts in Computational Science and Engineering) Fundamental Finite Element Analysis and Applications: with Mathematica and Matlab Computations Fundamental Concepts and Computations in Chemical Engineering (Prentice Hall International Series in the Physical and Chemical Engineering Sciences) Plastic Injection Molding: Product Design & Material Selection Fundamentals (Vol II: Fundamentals of Injection Molding) (Fundamentals of injection molding series) Plastic Injection Molding: Mold Design and Construction Fundamentals (Fundamentals of Injection Molding) (2673) (Fundamentals of injection molding series) Architecture of Human Living Fascia: Cells and Extracellular Matrix as Revealed by Endoscopy (Book & DVD) The Matrix Repatterning Program for Pain Relief: Self-Treatment for Musculoskeletal Pain (New Harbinger Self-Help Workbook) Tango for Teachers: The tango matrix Handbook of Biblical Social Values, Third Edition (Matrix: The Bible in Mediterranean Context) The Digital Matrix: New Rules for Business Transformation Through Technology Reclaiming The Menstrual Matrix : Evolving Feminine Wisdom A Workbook