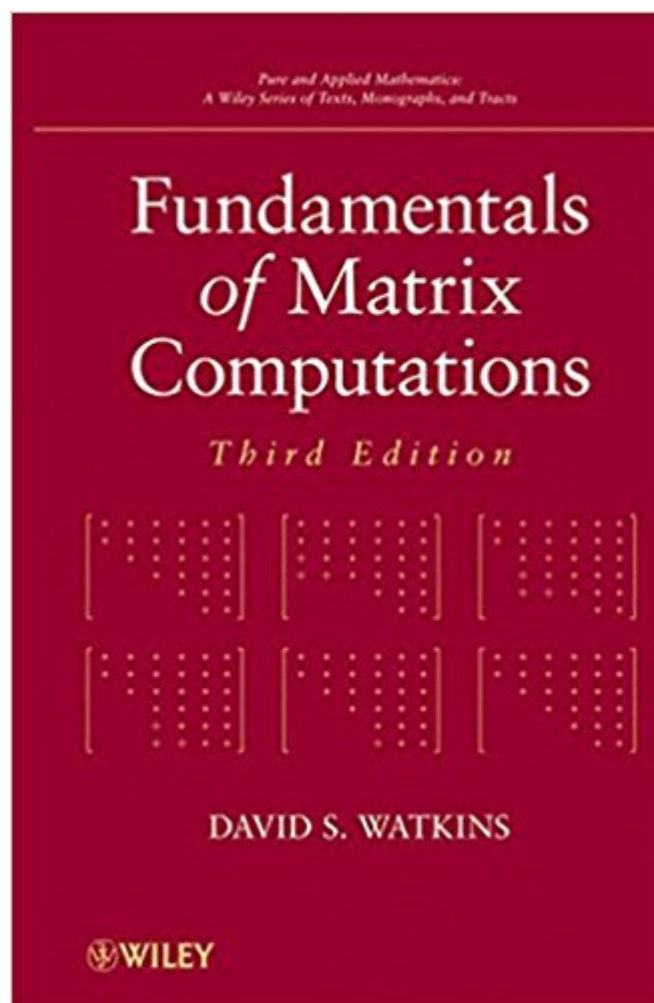


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# Fundamentals Of Matrix Computations



## 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 exercises—ranging from routine computations and verifications to challenging programming and proofs—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

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## Customer Reviews

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.

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.)

This book is not that famous as the Golub/van Loan bible but it is more than competitive. Especially for undergraduate or even graduate students who want to become familiar with computational aspects of linear algebra the bible might be too compact; Watkins gives one more help to understand the main ideas.

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 now porting all of the algorithms I wrote for the class into R. Highly recommended!

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