



# Numerical Linear Algebra with Applications: Using MATLAB

By William Ford

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**Numerical Linear Algebra with Applications: Using MATLAB** By William Ford

*Numerical Linear Algebra with Applications* is designed for those who want to gain a practical knowledge of modern computational techniques for the numerical solution of linear algebra problems, using MATLAB as the vehicle for computation. The book contains all the material necessary for a first year graduate or advanced undergraduate course on numerical linear algebra with numerous applications to engineering and science. With a unified presentation of computation, basic algorithm analysis, and numerical methods to compute solutions, this book is ideal for solving real-world problems.

The text consists of six introductory chapters that thoroughly provide the required background for those who have not taken a course in applied or theoretical linear algebra. It explains in great detail the algorithms necessary for the accurate computation of the solution to the most frequently occurring problems in numerical linear algebra. In addition to examples from engineering and science applications, proofs of required results are provided without leaving out critical details. The Preface suggests ways in which the book can be used with or without an intensive study of proofs.

This book will be a useful reference for graduate or advanced undergraduate students in engineering, science, and mathematics. It will also appeal to professionals in engineering and science, such as practicing engineers who want to see how numerical linear algebra problems can be solved using a programming language such as MATLAB, MAPLE, or Mathematica.

- Six introductory chapters that thoroughly provide the required background for those who have not taken a course in applied or theoretical linear algebra
- Detailed explanations and examples
- A through discussion of the algorithms necessary for the accurate computation of the solution to the most frequently occurring problems in numerical linear algebra
- Examples from engineering and science applications

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### Editorial Review

#### Review

"An important part of the book deals with iterative methods for solving large sparse systems. We can find here Jacobi, Gauss-Seidel and successive overrelaxation (SOR) methods, as well as Krylov subspace methods..." --**Zentralblatt Math**

"...this is a book that merits careful consideration as a possible text for a course in numerical linear algebra, particularly one stressing applications to engineering and other areas of science." --**MAA Reviews, January 2015**

#### From the Back Cover

Designed for those who want to gain a practical knowledge of modern computational techniques for the numerical solution of linear algebra problems, this book contains all the material necessary for a graduate course on numerical linear algebra and numerous applications to engineering and science used in industry. Presenting a unified presentation of computation, basic algorithm analysis and numerical methods to compute solutions, *Numerical Linear Algebra with Applications* is ideal for solving real-world, practical problems. This reference provides necessary mathematical background information for those who want to learn to solve linear algebra problems using the programming language Matlab, in addition to offering a thorough explanation of the issues and methods for practical computation while avoiding an extensive theorem-proof type of exposition for practical use.

#### About the Author

William Ford received his undergraduate education at MIT in applied mathematics and a Ph.D. in mathematics from the University of Illinois in 1972. His area of research was the numerical solution of partial differential equations, and the results of his work were published in three top-flight journals. After two years at Clemson University, he accepted an appointment at the University of the Pacific in Stockton, CA, where he taught mathematics and computer science. In 1986, he became a founding member of the Department of Computer Science that is now located in the School of Engineering and Computer Science. He served as Chair of the Department for eleven years and retired in 2014 as a recipient of the Order of Pacific, the highest award the University gives.

Dr. Ford is the co-author of five computer science texts and two commercial software packages. For many years, he has taught computation for engineers, discrete mathematics, and computing theory. His interest in writing a book on numerical linear algebra arose from working with graduate engineering students. There is a tremendous need for engineers to be familiar with numerical linear algebra and its applications. Dr. Ford saw the need for the subject to be taught at the advanced undergraduate as well as the beginning graduate level. Yet, most engineering students have only applied linear algebra available to them, and books in the subject only touch on numerical aspects. The basics of linear algebra are necessary before a study of numerical linear algebra can begin, but few institutions can afford to offer two separate courses. As a result, he developed a book that in the early chapters provides the linear algebra necessary for a study of how to perform accurate computation in such problems such as solving general and specialized square linear systems, least-squares, computation of eigenvalues, and the iterative solution of large, sparse systems. The book contains many computational exercises and carefully chosen written exercises. Some of these written

exercises introduce methods not directly covered in the text but, in each case, the method is developed in understandable parts. The same is true of proofs, and hints are provided for the most difficult problems.

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following is your body and mind will be pleased when you are finished studying it, like winning a game. Do you want to try this extraordinary shelling out spare time activity?

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