

Applied numerical linear algebra

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Abstrak

Designed for first-year graduate students from a variety of engineering and scientific disciplines, this comprehensive textbook covers the solution of linear systems, least squares problems, eigenvalue problems, and the singular value decomposition. The author, who helped design the widely used LAPACK and ScaLAPACK linear algebra libraries, draws on this experience to present state-of-the-art techniques for these problems, including recommending which algorithms to use in various practical situations. Algorithms are derived in a mathematically illuminating way, including condition numbers and error bounds. Direct and iterative algorithms, suitable for dense and sparse matrices, are discussed. Algorithm design for modern computer architectures, where moving data is often more expensive than arithmetic operations, is discussed in detail, using LAPACK as an illustration. There are many numerical examples throughout the text and in the problems at the ends of chapters, most of which are written in MATLAB and are freely available on the Web.