Matrix algorithms, volume 2: eigensystems

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Abstrak

This book is the second volume in a projected five-volume survey of numerical linear algebra and matrix algorithms. This volume treats the numerical solution of dense and large-scale eigenvalue problems with an emphasis on algorithms and the theoretical background required to understand them. Stressing depth over breadth, Professor Stewart treats the derivation and implementation of the more important algorithms in detail. The notes and references sections contain pointers to other methods along with historical comments. The book is divided into two parts: dense eigenproblems and large eigenproblems. The first part gives a full treatment of the widely used QR algorithm, which is then applied to the solution of generalized eigenproblems and the computation of the singular value decomposition. The second part treats Krylov sequence methods such as the Lanczos and Arnoldi algorithms and presents a new treatment of the Jacobi-Davidson method.

The volumes in this survey are not intended to be encyclopedic. By treating carefully selected topics in depth, each volume gives the reader the theoretical and practical background to read the research literature and implement or modify new algorithms. The algorithms treated are illustrated by pseudocode that has been tested in MATLAB implementations.