The Algebraic Eigenvalue Problem

Inverse Eigenvalue ProblemsLarge Scale Eigenvalue ProblemsThe Algebraic Eigenvalue ProblemARPACK Users' GuideNumerical Methods for General and Structured Eigenvalue ProblemsCompact Numerical Methods for ComputersLinear AlgebraInformation Bounds and Nonparametric Maximum Likelihood EstimationThe Symmetric Eigenvalue ProblemParallel Jacobi Algorithms for the Algebraic Eigenvalue ProblemSpectral Theory and Nonlinear Functional AnalysisNumerical Methods for Eigenvalue ProblemsAn Oscillation Theorem for Algebraic Eigenvalue Problems and its ApplicationsIterative Method for the Solution of the Algebraic Eigenvalue Problem for Hermitian MatricesThe Matrix Eigenvalue ProblemAn oscillation theorem for algebraic eigenvalue problems and iDynamical Inverse Problems: Theory and ApplicationStructure-Preserving Doubling Algorithms for Nonlinear Matrix EquationsIntroduction to Matrix ComputationsMethods in Computational Molecular PhysicsTemplates for the Solution of Algebraic Eigenvalue ProblemsIntroduction to Computational Linear AlgebraApplied Numerical Linear AlgebraThe Algebraic Eigenvalue Problem, By J.H. WilkinsonNumerical Methods for Large Eigenvalue ProblemsThe Algebraic Eigenvalue ProblemApplied Linear Algebra in ActionHandbook for Automatic ComputationMatrix PencilsLarge Scale Eigenvalue ProblemsNumerical Linear Algebra and Applications, Second EditionThe Algebraic Eigenvalue ProblemAn Oscillation Theorem for Algebraic Eigenvalue Problems and Its ApplicationsThe Algebraic Eigenvalue ProblemComputational

Methods of Linear AlgebraThe Algebraic Multigrid Projection for Eigenvalue Problems; Backrotations and Multigrid Fixed PointsAn Introduction to Inverse Algebraic Eigenvalue ProblemsAn Introduction to Numerical MathematicsAlgorithms for the Nonsymmetric Algebraic Eigenvalue ProblemNumerical Linear Algebra with Applications

Inverse Eigenvalue Problems

This textbook presents a number of the most important numerical methods for finding eigenvalues and eigenvectors of matrices. The authors discuss the central ideas underlying the different algorithms and introduce the theoretical concepts required to analyze their behaviour. Several programming examples allow the reader to experience the behaviour of the different algorithms first-hand. The book addresses students and lecturers of mathematics and engineering who are interested in the fundamental ideas of modern numerical methods and want to learn how to apply and extend these ideas to solve new problems.

Large Scale Eigenvalue Problems

The Algebraic Eigenvalue Problem

ARPACK Users' Guide

This second edition of Compact Numerical Methods for Computers presents reliable yet compact algorithms for computational problems. As in the previous edition, the author considers specific mathematical problems of wide applicability, develops approaches to a solution and the consequent algorithm, and provides the program steps. He emphasizes usefu

Numerical Methods for General and Structured Eigenvalue Problems

Results of research into large scale eigenvalue problems are presented in this volume. The papers fall into four principal categories: novel algorithms for solving large eigenvalue problems, novel computer architectures, computationally-relevant theoretical analyses, and problems where large scale eigenelement computations have provided new insight.

Compact Numerical Methods for Computers

Linear Algebra

Information Bounds and Nonparametric Maximum Likelihood Estimation

The Symmetric Eigenvalue Problem

Parallel Jacobi Algorithms for the Algebraic Eigenvalue Problem

The development of the internationally standardized language ALGOL has made it possible to prepare procedures which can be used without modification whenever a computer with an ALGOL translator is available. Volume Ia in this series gave details of the restricted version of ALGOL which is to be employed throughout the Handbook, and volume Ib described its implementation on a computer. Each of the subsequent volumes will be devoted to a presentation of the basic algorithms in some specific areas of numerical analysis. This is the first such volume and it was feIt that the topic Linear Algebra was a natural choice, since the relevant algorithms are perhaps the most widely used in numerical analysis and have the advantage of forming a weil defined dass. The algorithms described here fall into two main categories, associated with the solution of linear systems and the algebraic eigenvalue problem respectively and each set is preceded by an introductory chapter giving a comparative assessment.

Spectral Theory and Nonlinear Functional Analysis

An Introduction to Numerical Mathematics provides information pertinent to the fundamental aspects of numerical mathematics. This book covers a variety of topics, including linear programming, linear and nonlinear algebra, polynomials, numerical differentiation, and approximations. Organized into seven chapters, this book begins with an overview of the solution of linear problems wherein numerical mathematics provides very effective algorithms consisting of finitely many computational steps. This text then examines the method for the direct solution of a definite problem. Other chapters consider the determination of frequencies in freely oscillating mechanical or electrical systems. This book discusses as well eigenvalue problems for oscillatory systems of finitely many degrees of freedom, which can be reduced to algebraic equations. The final chapter deals with the approximate representation of a function f(x) given by I-values as in the form of a table. This book is a valuable resource for physicists, mathematicians, theoreticians, engineers, and research workers.

Numerical Methods for Eigenvalue Problems

Proceedings of the NATO Advanced Study Institute, Bad Windsheim, Germany, August 1982

An Oscillation Theorem for Algebraic Eigenvalue Problems and its Applications

Iterative Method for the Solution of the Algebraic Eigenvalue Problem for Hermitian Matrices

This Research Note addresses several pivotal problems in spectral theory and nonlinear functional analysis in connection with the analysis of the structure of the set of zeroes of a general class of nonlinear operators. It features the construction of an optimal algebraic/analytic invariant for calculating the Leray-Schauder degree, new methods for solving nonlinear equations in Banach spaces, and general properties of components of solutions sets presented with minimal use of topological tools. The author also gives several applications of the abstract theory to reaction diffusion equations and systems. The results presented cover a thirty-year period and include recent, unpublished findings of the author and his coworkers. Appealing to a broad audience, Spectral Theory and Nonlinear Functional Analysis contains many important contributions to linear algebra, linear and nonlinear functional analysis, and topology and opens the door for further advances.

The Matrix Eigenvalue Problem

Results of research into large scale eigenvalue problems are presented in this volume. The papers fall into four principal categories: novel algorithms for solving large eigenvalue problems, novel computer architectures, computationally-relevant theoretical analyses, and problems where large scale eigenelement computations have provided new insight.

An oscillation theorem for algebraic eigenvalue problems and i

This book contains the lecture notes for a DMV course presented by the authors at Gunzburg, Germany, in September, 1990. In the course we sketched the theory of information bounds for non parametric and semiparametric models, and developed the theory of non parametric maximum likelihood estimation in several particular inverse problems: interval censoring and deconvolution models. Part I, based on Jon Wellner's lectures, gives a brief sketch of information lower bound theory:

Hajek's convolution theorem and extensions, useful minimax bounds for parametric problems due to Ibragimov and Has'minskii, and a recent result characterizing differentiable functionals due to van der Vaart (1991). The differentiability theorem is illustrated with the examples of interval censoring and deconvolution (which are pursued from the estimation perspective in part II). The differentiability theorem gives a way of clearly distinguishing situations in which 1 2 the parameter of interest can be estimated at rate n / and situations in which this is not the case. However it says nothing about which rates to expect when the functional is not differentiable. Even the casual reader will notice that several models are introduced, but not pursued in any detail; many problems remain. Part II, based on Piet Groeneboom's lectures, focuses on non parametric maximum likelihood estimates (NPMLE's) for certain inverse problems. The first chapter deals with the interval censoring problem.

Dynamical Inverse Problems: Theory and Application

Nonlinear matrix equations arise frequently in applied science and engineering. This is the first book to provide a unified treatment of structure-preserving doubling algorithms that have been recently studied and proven effective for notoriously challenging problems, such as fluid queue theory and vibration analysis for high speed trains; present recent developments and results for the theory of doubling algorithms for nonlinear matrix equations associated with regular matrix pencils; and highlight the use of doubling algorithms in achieving robust solutions for notoriously challenging problems that other methods cannot.? Structure-Preserving Doubling Algorithms for Nonlinear Matrix Equations is intended for researchers and computational scientists, and graduate students may also find it of interest.

Structure-Preserving Doubling Algorithms for Nonlinear Matrix Equations

Full of features and applications, this acclaimed textbook for upper undergraduate level and graduate level students includes all the major topics of computational linear algebra, including solution of a system of linear equations, least-squares solutions of linear systems, computation of eigenvalues, eigenvectors, and singular value problems. Drawing from numerous disciplines of science and engineering, the author covers a variety of motivating applications. When a physical problem is posed, the scientific and engineering significance of the solution is clearly stated. Each chapter contains a summary of the important concepts developed in that chapter, suggestions for further reading, and numerous exercises, both theoretical and MATLAB and MATCOM based. The author also provides a list of key words for quick reference. The MATLAB toolkit available online, 'MATCOM', contains implementations of the major algorithms in the book and will enable students to study different algorithms for the same problem, comparing efficiency, stability, and accuracy.

Introduction to Matrix Computations

Methods in Computational Molecular Physics

According to Parlett, "Vibrations are everywhere, and so too are the eigenvalues associated with them. As mathematical models invade more and more disciplines, we can anticipate a demand for eigenvalue calculations in an ever richer variety of contexts." Anyone who performs these calculations will welcome the reprinting of Parlett's book (originally published in 1980). In this unabridged, amended version, Parlett covers aspects of the problem that are not easily found elsewhere. The chapter titles convey the scope of the material succinctly. The aim of the book is to present mathematical knowledge that is needed in order to understand the art of computing eigenvalues of real symmetric matrices, either all of them or only a few. The author explains why the selected information really matters and he is not shy about making judgments. The commentary is lively but the proofs are terse. The first nine chapters are based on a matrix on which it is possible to make similarity transformations explicitly. The only source of error is inexact arithmetic. The last five chapters turn to large sparse matrices and the task of making approximations and judging them.

Templates for the Solution of Algebraic Eigenvalue Problems

A new paperback edition of Wilkinson's classic, pioneering text on the computation of matrix eigenvalues. One of the most important and widely-read books on numerical analysis ever published.

Introduction to Computational Linear Algebra

Mathematics of Computing -- Numerical Analysis.

Applied Numerical Linear Algebra

The Algebraic Eigenvalue Problem, By J.H. Wilkinson

This book is about computing eigenvalues, eigenvectors, and invariant subspaces of matrices. Treatment includes generalized and structured eigenvalue problems and all vital aspects of eigenvalue computations. A unique feature is the detailed treatment of structured eigenvalue problems, providing insight on accuracy and efficiency gains to be expected from algorithms that take the structure of a matrix into account.

Numerical Methods for Large Eigenvalue Problems

An in-depth, theoretical discussion of the two most important classes of algorithms for solving matrix eigenvalue problems.

The Algebraic Eigenvalue Problem

The present text book contains a collection of six high-quality articles. In particular, this book is devoted to Linear Mathematics by presenting problems in Applied Linear Algebra of general or special interest.

Applied Linear Algebra in Action

This comprehensive textbook is designed for first-year graduate students from a variety of engineering and scientific disciplines.

Handbook for Automatic Computation

Numerical linear algebra is far too broad a subject to treat in a single introductory volume. Stewart has chosen to treat algorithms for solving linear systems, linear least squares problems, and eigenvalue problems involving matrices whose elements can all be contained in the high-speed storage of a computer. By way of theory, the author has chosen to discuss the theory of norms and perturbation theory for linear systems and for the algebraic eigenvalue problem. These choices exclude, among other things, the solution of large sparse linear systems by direct and iterative methods, linear programming, and the useful Perron-Frobenious theory and its extensions. However, a person who has fully mastered the material in this book should be well prepared for independent study in other areas of numerical linear algebra.

Matrix Pencils

The proofs of the theorem for the algebraic multigrid projection (MGP) for eigenvalue problems, and of the multigrid fixed point theorem for multigrid cycles combining MGP with backrotations, are presented. The MGP and the backrotations are central eigenvector separation techniques for multigrid eigenvalue algorithms. They allow computation on coarse levels of eigenvalues of a given eigenvalue problem, and are efficient tools in the computation of eigenvectors.

Large Scale Eigenvalue Problems

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

Numerical Linear Algebra and Applications, Second Edition

This revised edition discusses numerical methods for computing eigenvalues and eigenvectors of large sparse matrices. It provides an in-depth view of the numerical methods that are applicable for solving matrix eigenvalue problems that arise in various engineering and scientific applications. Each chapter was updated by shortening or deleting outdated topics, adding topics of more recent interest, and adapting the Notes and References section. Significant changes have been made to Chapters 6 through 8, which describe algorithms and their implementations and now include topics such as the implicit restart techniques, the Jacobi-Davidson method, and automatic multilevel substructuring.

The Algebraic Eigenvalue Problem

Inverse eigenvalue problems arise in a remarkable variety of applications and associated with any inverse eigenvalue problem are two fundamental questions--the theoretical issue of solvability and the practical issue of computability. Both questions are difficult and challenging. In this text, the authors discuss the fundamental questions, some known results, many applications, mathematical properties, a variety of numerical techniques, as well as several open problems.This is the first book in the authoritative Numerical Mathematics and Scientific Computation series to cover numerical linear algebra, a broad area of numerical analysis. Authored by two world-renowned researchers, the book is aimed at graduates and researchers in applied mathematics, engineering and computer science and makes an ideal graduate text.

An Oscillation Theorem for Algebraic Eigenvalue Problems and Its Applications

The Algebraic Eigenvalue Problem

Teach Your Students Both the Mathematics of Numerical Methods and the Art of Computer ProgrammingIntroduction to Computational Linear Algebra presents classroom-tested material on computational linear algebra and its application to numerical solutions of partial and ordinary differential equations. The book is designed for senior undergraduate stud

Computational Methods of Linear Algebra

The Algebraic Multigrid Projection for Eigenvalue Problems; Backrotations and Multigrid Fixed Points

An Introduction to Inverse Algebraic Eigenvalue Problems

The papers in this volume present an overview of the general aspects and practical applications of dynamic inverse methods, through the interaction of several topics, ranging from classical and advanced inverse problems in vibration, isospectral systems, dynamic methods for structural identification, active vibration control and damage detection, imaging shear stiffness in biological tissues, wave propagation, to computational and experimental aspects relevant for engineering problems.

An Introduction to Numerical Mathematics

Algorithms for the Nonsymmetric Algebraic Eigenvalue Problem

Numerical Linear Algebra with Applications

This book is a guide to understanding and using the software package ARPACK to solve large algebraic eigenvalue problems. The software described is based on the implicitly restarted Arnoldi method, which has been heralded as one of the three most important advances in large scale eigenanalysis in the past ten years. The book explains the acquisition, installation, capabilities, and detailed use of the software for computing a desired subset of the eigenvalues and eigenvectors of large (sparse) standard or generalized eigenproblems. It also discusses the underlying theory and algorithmic background at a level that is accessible to the general practitioner.