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Spectral Methods for Non-Standard Eigenvalue Problems : Fluid and Structural Mechanics and Beyond

By Calin-Ioan Gheorghiu

Springer International Publishing Mai 2014, 2014. Taschenbuch. Condition: Neu. Neuware - This book focuses on the constructive and practical aspects of spectral methods. It rigorously examines the most important qualities as well as drawbacks of spectral methods in the context of numerical methods devoted to solve non-standard eigenvalue problems. In addition, the book also considers some nonlinear singularly perturbed boundary value problems along with eigenproblems obtained by their linearization around constant solutions. The book is mathematical, posing problems in their proper function spaces, but its emphasis is on algorithms and practical difficulties. The range of applications is quite large. High order eigenvalue problems are frequently beset with numerical ill conditioning problems. The book describes a wide variety of successful modifications to standard algorithms that greatly mitigate these problems. In addition, the book makes heavy use of the concept of pseudospectrum, which is highly relevant to understanding when disaster is imminent in solving eigenvalue problems. It also envisions two classes of applications, the stability of some elastic structures and the hydrodynamic stability of some parallel shear flows. This book is an ideal reference text for professionals (researchers) in applied mathematics, computational physics and engineering. It will be very useful to numerically sophisticated...



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