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Jie Shen Tao Tang Li-Lian Wan

Spectral Methods

Algorithms, Analysis and Applications

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Spectral Methods

Algorithms, Analysis and Applications

- The analysis in this book is presented in a unified framework using the nonuniformly weighted Sobolev spaces which lead to simplified analysis and more precise estimates.
- The book contains, in particular, efficient spectral algorithms and their error analysis for higher-order differential equations, integral equations, problems in unbounded domains and high-dimensional domains.
- A set of well structured Matlab codes is available online so the readers can easily modify and expand.

Along with finite differences and finite elements, spectral methods are one of the three main methodologies for solving partial differential equations on computers. This book provides a detailed presentation of basic spectral algorithms, as well as a systematical presentation of basic convergence theory and error analysis for spectral methods. Readers of this book will be exposed to a unified framework for designing and analyzing spectral algorithms for a variety of problems, including in particular high-order differential equations and problems in unbounded domains. The book contains a large number of figures which are designed to illustrate various concepts stressed in the book. A set of basic matlab codes has been made available online to help the readers to develop their own spectral codes for their specific applications.

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