The Application of the Chebyshev-Spectral Method in Transport Phenomena [

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Springer Berlin Heidelberg :
Imprint: Springer,
2012

Engineering | Computer science | Hydraulic engineering | Engineering | Engineering Thermodynamics, Heat and Mass Transfer | Numerical and Computational Physics | Engineering Fluid Dynamics | Fluid- and Aerodynamics | Computational Science and Engineering

Monografía

Transport phenomena problems that occur in engineering and physics are often multi-dimensional and multi-phase in character. When taking recourse to numerical methods the spectral method is particularly useful and efficient. The book is meant principally to train students and non-specialists to use the spectral method for solving problems that model fluid flow in closed geometries with heat or mass transfer. To this aim the reader should bring a working knowledge of fluid mechanics and heat transfer and should be readily conversant with simple concepts of linear algebra including spectral decomposition of matrices as well as solvability conditions for inhomogeneous problems. The book is neither meant to supply a ready-to-use program that is all-purpose nor to go through all manners of mathematical proofs. The focus in this tutorial is on the use of the spectral methods for space discretization, because this is where most of the difficulty lies. While time dependent problems are also of great interest, time marching procedures are dealt with by briefly introducing and providing a simple, direct, and efficient method. Many examples are provided in the text as well as numerous exercises for each chapter. Several of the examples are attended by subtle points which the reader will face while working them out. Some of these points are deliberated upon in endnotes to the various chapters, others are touched upon in the book itself

Título: The Application of the Chebyshev-Spectral Method in Transport Phenomena Recurso electrónico] by Weidong Guo, Grard Labrosse, Ranga Narayanan

Editorial: Berlin, Heidelberg Springer Berlin Heidelberg Imprint: Springer 2012

Descripción física: XII, 229 p. 52 illus., 1 illus. in color. digital

Mención de serie: Lecture Notes in Applied and Computational Mechanics 1613-7736 68

Documento fuente: Springer eBooks

Contenido: An Introduction to the Book and a Road Map -- An Introduction to the Spectral Method -- Steady One-Dimensional (1D) Heat Conduction Problems -- Unsteady 1D Heat Conduction Problems -- Steady Two-Dimensional (2D) Heat Conduction Problems -- 2D Closed Flow Problems - The Driven Cavity -- Applications to Hydrodynamic Instabilities -- Exercises for the Reader -- References -- Index

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Formato físico adicional: Disponible versión electrónica e impresa

Detalles del sistema: Modo de acceso: World Wide Web

Fuente de adquisición directa: Springer

ISBN: 9783642340888 978-3-642-34088-8 9783642340871 ed. impresa)

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Entidades: SpringerLink (Online service)
