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3.2.3 Analysis of the forcing schemes; 3.2.4 Forcing scheme for MRT-LBE; 3.3 LBE with Nonuniform Grids; 3.3.1 Grid-refinement and multi-block methods; 3.3.2 Interpolation methods; 3.3.3 Finite-difference based LBE methods; 3.3.4 Finite-volume based LBE methods; 3.3.5 Finite-element based LBE methods
3.3.6 Taylor series expansion and least square based methods
3.4 Accelerated LBE Methods for Steady Flows; 3.4.1 Spectrum analysis of the hydrodynamic equations of the standard LBE; 3.4.2 Time-independent methods; 3.4.3 Time-dependent methods; 3.5 Summary;
Chapter 4 Sample Applications of LBE for Isothermal Flows; 4.1 Algorithm Structure of LBE; 4.2 Lid-Driven Cavity Flow; 4.3 Flow around a Fixed Circular Cylinder; 4.4 Flow around an Oscillating Circular Cylinder with a Fixed Downstream One; 4.5 Summary; Chapter 5 LBE for Low Speed Flows with Heat Transfer; 5.1 Multi-speed Models
5.1.1 Low-order models
5.1.2 High-order models; 5.2 MS-LBE Models Based on Boltzmann Equation; 5.2.1 Hermite expansion of distribution function; 5.2.2 Temperature/flow-dependent discrete velocities; 5.2.3 Temperature-dependent discrete velocities; 5.2.4 Constant discrete velocities; 5.2.5 MS-LBGK models based on DVBE with constant discrete velocities; 5.3 Off-Lattice LBE Models; 5.4 MS-LBE Models with Adjustable Prandtl Number; 5.5 DDF-LBE Models without Viscous Dissipation and Compression Work; 5.5.1 DDF-LBE based on multi-component models; 5.5.2 DDF-LBE for non-ideal gases
5.5.3 DDF-LBE for incompressible flows

Sommario/riassunto

Lattice Boltzmann method (LBM) is a relatively new simulation technique for the modeling of complex fluid systems and has attracted interest from researchers in computational physics. Unlike the traditional CFD methods, which solve the conservation equations of macroscopic properties (i.e., mass, momentum, and energy) numerically, LBM models the fluid consisting of fictive particles, and such particles perform consecutive propagation and collision processes over a discrete lattice mesh. This book will cover the fundamental and practical application of LBM. The first part of the book consists of
