1. Record Nr. UNINA9911007352403321

Autore	Shahbazi Khosro
Titolo	Finite Difference Methods for Compressible Two-Fluid Dynamics / / by Khosro Shahbazi
Pubbl/distr/stampa	Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2025
ISBN	3-031-87341-6
Edizione	[1st ed. 2025.]
Descrizione fisica	1 online resource (364 pages)
Collana	Forum for Interdisciplinary Mathematics, , 2364-6756
Disciplina	519
Soggetti	Mathematics Chemometrics Fluid mechanics Mathematical physics Applications of Mathematics Mathematical Applications in Chemistry Engineering Fluid Dynamics Mathematical Physics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Introduction and Basic Dynamics of Compressible Medium -- Interpolation and High-Order Non-Linear Finite Difference Schemes.- Approximation On and Near Boundary -- High-Order Time Integration Methods -- High-order Nonlinear Schemes for Nonlinear Conservation Laws -- Schemes for Compressible Two-Fluid Model -- Schemes for Compressible Two-Fluid Navier-Stokes Equations.-Thermodynamic Property Relations for Two-Phase Modeling -- Mixture Theory Modeling of Compressible Two-Phase Systems.
Sommario/riassunto	Finite Difference Methods for Compressible Two-Fluid Dynamics provides the essentials of high-order numerical methods for compressible single-fluid and two-fluid transport phenomena. This book can serve as a first course on the numerical methods for transport phenomena or fluid dynamics for students in mechanical, aerospace, and chemical engineering, applied mathematics, and physics at the senior level of an undergraduate or graduate degree. It also provides foundations and algorithmic details for implementing the most recent

numerical schemes for compressible flows and extending them to include other physics, such as elasticity, reaction, and magnetohydrodynamics. The book's presented schemes enable computations for broad applications, including shock-induced interfacial instability and turbulence, shock-bubble interactions, and detonation, to name a few. For a broad reach and impact, the numerical schemes satisfy the simultaneous requirements of simplicity, extendibility, and efficiency on serial and parallel computers. The physics of the compressible single- and two-fluid system also guide the design and analysis of the numerical methods. The enabled direct numerical simulations also help obtain accurate data for tuning the emerging physics-based neuromorphic algorithms.