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momentum coupling terms; 5.1.2 Final form of conservation equations; 5.1.3 Characteristic analysis - eigenvalues; 5.1.4 Characteristic analysis - eigenvectors and splitting of coefficient matrix; 5.1.5 Homogeneous flow conditions as a limiting case; 5.1.6 Use of conservative variables; 5.1.7 Quasi-one-dimensional flow through channels of variable cross section; 5.2 Two-dimensional two-phase flow conditions; 5.2.1 Basic flow equations for two-dimensional flow; 5.2.2 Eigenvalues and split matrices; 5.2.3 Conservative form of flow equations; 5.3 Final remarks to the hyperbolic two-phase flow model; References; 6 Dispersion of Sound Waves; 6.1 Acoustic approximation of flow equations; 6.2 Dispersion analysis of gas-particle flows; References; 7 Numerical Methods for Hyperbolic Two-Phase Flow System Equations; 7.1 Mathematical nature of two-phase flow equations; 7.2 Overview on hyperbolic numerical methods; 7.3 The Split Coefficient Matrix method; 7.4 Godunov methods and Approximate Riemann solver; 7.4.1 General Godunov approach; 7.4.2 The linearized Riemann solver; 7.4.3 The Roe solver; 7.5 Flux Vector Splitting method; References; 8 Remarks on the Advanced Two-Phase Flow Module; 8.1 Basic modeling approach; 8.1.1 Balance equations of two-fluid model; 8.1.2 Flow topology and interfacial area; 8.1.3 Algebraic source terms; 8.1.4 State properties; 8.2 Numerical method; 8.2.1 Conservative form of flow equations; 8.2.2 Finite volume discretization; 8.2.3 Second-order accuracy; 8.2.4 Implicit time integration; References; 9 Numerical Results and Applications; 9.1 Phase separation and void waves; 9.1.1 Analytical model; 9.1.2 Numerical results; 9.2 U-tube oscillations; 9.2.1 Analytical solution; 9.2.2 Numerical results; 9.3 Pressure wave propagation phenomena; 9.3.1 Single-phase gas flow; 9.3.2 Two-phase flow; 9.4 Shock tube; 9.4.1 Single-phase gas; 9.4.2 Two-phase flow; 9.5 Multidimensional wave propagation and explosion phenomena; 9.5.1 Single-phase gas flow; 9.5.2 Two-phase flow

Sommario/riassunto

Here, the author, a researcher of outstanding experience in this field, summarizes and combines the recent results and findings on advanced two-phase flow modeling and numerical methods otherwise dispersed in various journals, while also providing explanations for numerical and modeling techniques previously not covered by other books. The resulting systematic and comprehensive monograph is unrivalled in its kind, serving as a reference for both researchers and engineers working in engineering as well as in environmental science.
