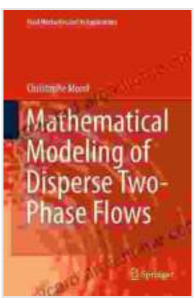
Mathematical Modeling of Disperse Two Phase Flows: Fluid Mechanics and Its Applications

Disperse two-phase flows are encountered in a wide range of applications, such as fluidized beds, spray combustion, and particle-laden flows. These flows are characterized by the presence of two distinct phases, such as a gas and a liquid or a gas and a solid, which are dispersed in each other. The mathematical modeling of these flows is a complex and challenging task, due to the need to account for the interactions between the two phases.



Mathematical Modeling of Disperse Two-Phase Flows (Fluid Mechanics and Its Applications Book 114)

by Christophe Morel

5 out of 5

Language	: English
File size	: 16683 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Word Wise	: Enabled
Print length	: 545 pages

This book provides a comprehensive to the mathematical modeling of disperse two-phase flows. It covers the fundamental principles and theoretical underpinnings of these flows, as well as the latest developments in numerical modeling techniques. The book also includes a wealth of examples and case studies to illustrate the application of these methods in practice.

Fundamental Principles

The fundamental principles of disperse two-phase flows are based on the conservation of mass, momentum, and energy. These conservation equations can be used to derive a set of governing equations that describe the behavior of the two phases. The governing equations can be solved using a variety of numerical methods, such as the finite volume method, the finite element method, and the spectral method.

Theoretical Underpinnings

The theoretical underpinnings of disperse two-phase flows are based on the theory of continuum mechanics. Continuum mechanics is a branch of physics that deals with the behavior of continuous media, such as fluids and solids. The theory of continuum mechanics can be used to derive a set of constitutive equations that describe the constitutive behavior of two-phase flows. The constitutive equations can be used to relate the stress tensor and the strain rate tensor in the two phases.

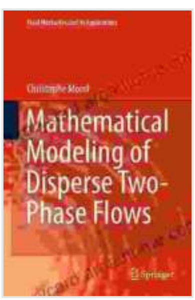
Numerical Modeling Techniques

Numerical modeling techniques are used to solve the governing equations of two-phase flows. These techniques can be classified into two main categories: Eulerian methods and Lagrangian methods. Eulerian methods are based on the idea of solving the governing equations in a fixed spatial domain, while Lagrangian methods are based on the idea of following the motion of individual particles.

Examples and Case Studies

The book includes a wealth of examples and case studies to illustrate the application of numerical modeling techniques to two-phase flows. These examples and case studies cover a wide range of applications, such as fluidized beds, spray combustion, and particle-laden flows.

This book provides a comprehensive to the mathematical modeling of disperse two-phase flows. It covers the fundamental principles and theoretical underpinnings of these flows, as well as the latest developments in numerical modeling techniques. The book also includes a wealth of examples and case studies to illustrate the application of these methods in practice. This book is an essential resource for researchers, engineers, and graduate students who are interested in the mathematical modeling of disperse two-phase flows.



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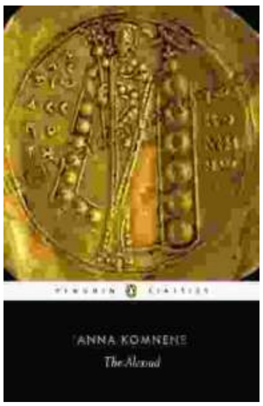

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