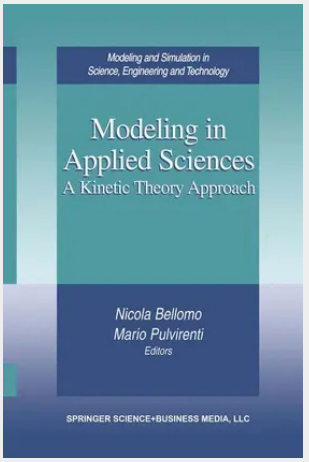
Bellomo / Pulvirenti

Modeling in Applied Sciences

A Kinetic Theory Approach



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Modeling complex biological, chemical, and physical systems, in the context of spatially heterogeneous mediums, is a challenging task for scientists and engineers using traditional methods of analysis.

is a comprehensive survey of modeling large systems using kinetic equations, and in particular the Boltzmann equation and its generalizations. An interdisciplinary group of leading authorities carefully develop the foundations of kinetic models and discuss the connections and interactions between model theories, qualitative and computational analysis and real-world applications. This book provides a thoroughly accessible and lucid overview of the different aspects, models, computations, and methodology for the kinetic-theory modeling process.

Topics and Features:

* Integrated modeling perspective utilized in all chapters

* Fluid dynamics of reacting gases

* Self-contained introduction to kinetic models

* Becker–Doring equations

* Nonlinear kinetic models with chemical reactions

* Kinetic traffic-flow models

* Models of granular media

* Large communication networks

* Thorough discussion of numerical simulations of Boltzmann equation

This new book is an essential resource for all scientists and engineers who use large-scale computations for studying the dynamics of complex systems of fluids and particles. Professionals, researchers, and postgraduates will find the book a modern and authoritative guide to the topic.

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