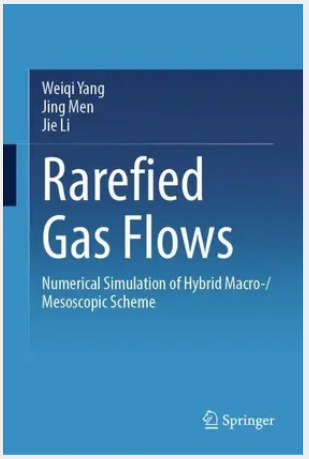
Yang / Men / Li

Rarefied Gas Flows

Numerical Simulation of Hybrid Macro-/Mesoscopic Scheme



This book provides a systematic overview and classification on modeling and simulation of rarefied gas flows and develops novel algorithms to tackle some of these unsolved problems, facilitating a better understanding of multi-scale simulation and providing references for practical problem-solving in the relevant fields. All these methods presented in this book are verified by specific scenarios. It is worth mentioning that in the context of disciplinary integration and artificial intelligence, the research ideas, methods, and models in this book can be further integrated and developed. From application perspectives, they can also extend from traditional computational fluid dynamics, heat and mass transfer to emerging fields of shale gas extraction, micro-electro-mechanical systems development and re-entry spacecraft numerical simulation. The proposed hybrid algorithm in this book is of practical significance and paves the way for simulating multi-scale gas flows in real engineering applications, which will be beneficial to undergraduate and postgraduate students in interdisciplinary disciplines including aerospace engineering, mechanical engineering, microfluidics and nanofluidics, etc. It is also intended for researchers and practical users in the fields of active flow control, non-equilibrium gas dynamics and multi-scale modeling.

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