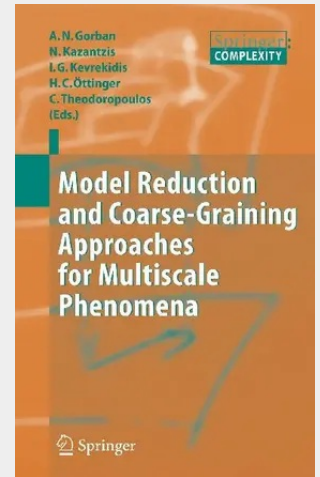


Model Reduction and Coarse-Graining Approaches for Multiscale Phenomena

Model reduction and coarse-graining are important in many areas of science and engineering. How does a system with many degrees of freedom become one with fewer? How can a reversible micro-description be adapted to the dissipative macroscopic model? These crucial questions, as well as many other related problems, are discussed in this book. Specific areas of study include dynamical systems, non-equilibrium statistical mechanics, kinetic theory, hydrodynamics and mechanics of continuous media, (bio)chemical kinetics, nonlinear dynamics, nonlinear control, nonlinear estimation, and particulate systems from various branches of engineering. The generic nature and the power of the pertinent conceptual, analytical and computational frameworks helps eliminate some of the traditional language barriers, which often unnecessarily impede scientific progress and the interaction of researchers between disciplines such as physics, chemistry, biology, applied mathematics and engineering. All contributions are authored by experts, whose specialities span a wide range of fields within science and engineering.

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