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Vorticity, Statistical Mechanics, and Monte Carlo Simulation

SMM

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Vorticity, Statistical Mechanics, and Monte Carlo Simulation

This book is drawn from across many active fields of mathematics and physics, and has connections to atmospheric dynamics, spherical codes, graph theory, constrained optimization problems, Markov Chains, and Monte Carlo methods. It addresses how to access interesting, original, and publishable research in statistical modeling of large-scale flows and several related fields. The authors of this book explicitly reach around the major branches of mathematics and physics, showing how the use of a few straightforward approaches can create a cornucopia of intriguing questions and provide the tools to answer them.

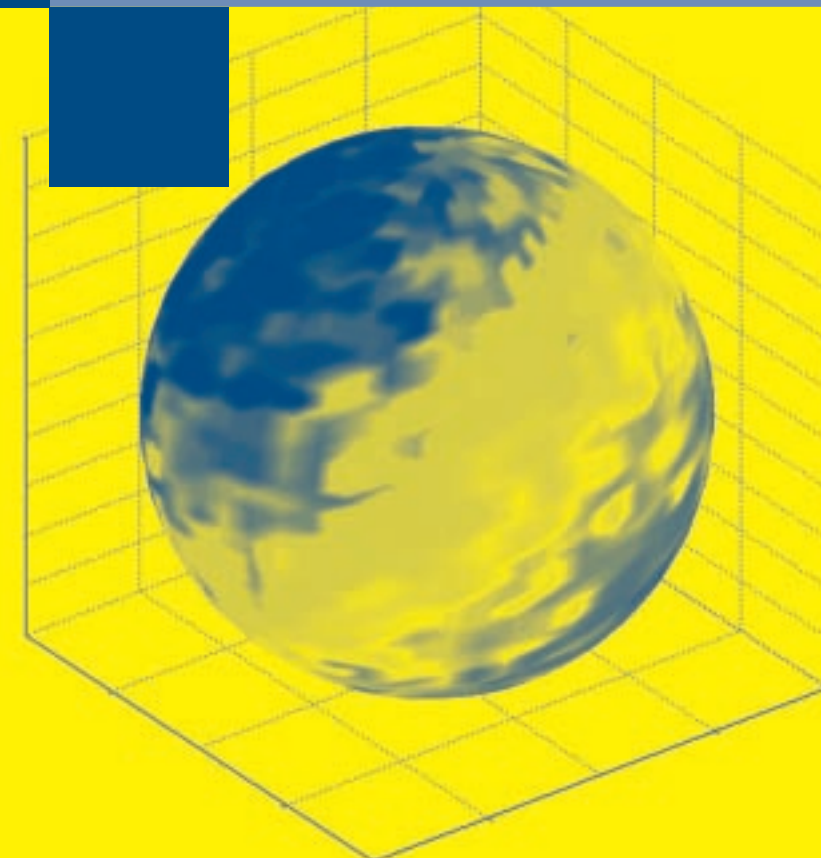
In this book, the reader will learn how to research a topic and how to understand statistical mechanics treatments of fluid dynamics. Of particular interest should be the application of Monte Carlo methods to problems like the dispersal of points on the sphere, the phase transitions of inviscid fluid flows in models that increasingly approximate the conditions of actual planetary atmospheres, and the treatment of negative absolute temperatures and the effects these extremely high-energy states have on fluid flows. Special attention is given to spherical models as well.

This book is intended for upper-level undergraduate or beginning level graduate courses of mathematics and physics. It will also be of use to readers interested in statistical mechanics methods applied to fluid mechanics problems. Readers will gain an understanding of how to synthesize new mathematics by applying familiar tools in new ways, and developing new tools to fit particular applications.

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