

Discover the Intriguing World of Kinetic Theory of Granular Gases in Oxford Graduate Texts!

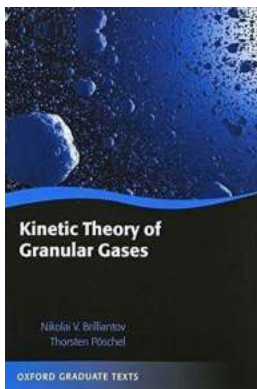
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Granular materials, such as sand, powders, and grains, exhibit unique behavior when subjected to forces and motions. Understanding and studying these behaviors have led to the development of the Kinetic Theory of Granular Gases, a fascinating field of study in physics.

What is Kinetic Theory of Granular Gases?

The Kinetic Theory of Granular Gases aims to understand the collective behavior of granular materials by considering them as individual particles with distinct properties, such as size, shape, and elasticity. This theory provides a framework to analyze the statistical mechanics and dynamics of granular systems.



Kinetic Theory of Granular Gases (Oxford Graduate Texts)

by Sarah Withrow King (1st Edition, Kindle Edition)

★★★★★ 5 out of 5

Language	: English
File size	: 177797 KB
Screen Reader	: Supported
Print length	: 142 pages
Lending	: Enabled
X-Ray for textbooks	: Enabled



Key Concepts and Principles:

Brownian Motion:

One of the fundamental concepts of the Kinetic Theory of Granular Gases is Brownian Motion. It refers to the random and chaotic movement of granular particles due to collisions and interactions with neighboring particles. This principle helps explain phenomena like diffusion and transport properties in granular materials.

Elastic and Inelastic Collisions:

In granular gases, collisions between particles can be elastic or inelastic, depending on the degree of energy transfer during the collision. Elastic collisions preserve the total kinetic energy of the system, while inelastic collisions lead to energy dissipation. Understanding these collision types is crucial for analyzing the behavior of granular materials under different conditions.

Jamming and Granular Flow:

Granular materials can display unique flow characteristics, such as jamming and granular flow. Jamming occurs when particles stop flowing due to an increase in packing density, while granular flow refers to the motion of particles in a fragmented manner. Studying these phenomena helps comprehend the behavior of grains and powders in industrial processes and natural phenomena like landslides.

Emerging Applications and Research:

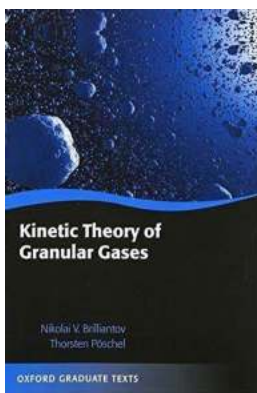
The Kinetic Theory of Granular Gases finds applications in various fields, including engineering, geophysics, and materials science. Researchers have used this theory to study the dynamics of avalanches, design efficient powder mixers, and understand the behavior of granular flows in manufacturing processes. The insights gained from this theory continue to contribute to advancements in multiple industries.

Oxford Graduate Texts:

Oxford Graduate Texts is a prestigious collection of books that delve into various scientific subjects, including the Kinetic Theory of Granular Gases. These texts are designed to cater to both graduate students and researchers, offering in-depth knowledge and comprehensive explanations of complex theories.

In :

The Kinetic Theory of Granular Gases is a captivating field of study that sheds light on the behavior of granular materials and their applications in real-world scenarios. By exploring the principles, concepts, and emerging research in this area, one can gain a deeper understanding of the intriguing world of granular physics.



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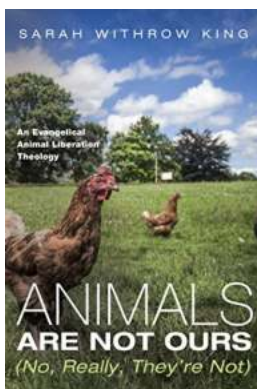
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"Kinetic Theory of Granular Gases" provides an to the rapidly developing theory of dissipative gas dynamics - a theory which has mainly evolved over the last decade. The book is aimed at readers from the advanced undergraduate level upwards and leads on to the present state of research. Throughout, special emphasis is put on a microscopically consistent description of pairwise particle collisions which leads to an impact-velocity-dependent coefficient of restitution. The description of the many-particle system, based on the Boltzmann equation, starts with the derivation of the velocity distribution function, followed by the investigation of self-diffusion and Brownian motion. Using hydrodynamical methods, transport processes and self-organized structure formation are studied. An appendix gives a brief to event-driven molecular dynamics. A second appendix describes a novel mathematical technique for derivation of kinetic properties, which allows for the application of computer algebra. The text is self-contained, requiring no mathematical or physical knowledge beyond that of standard physics undergraduate level. The material is adequate for a one-semester course and contains chapter summaries as well as exercises with detailed solutions. The molecular dynamics and computer-algebra programs can be downloaded from a companion web page.



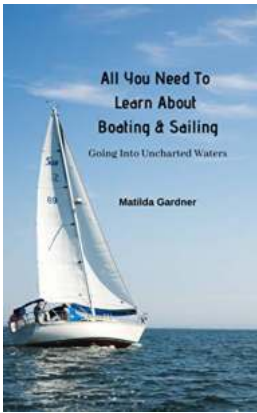
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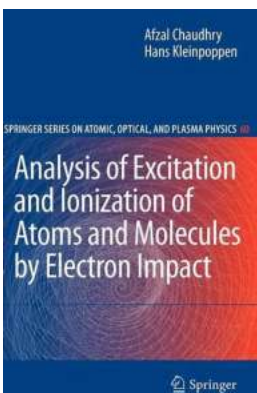
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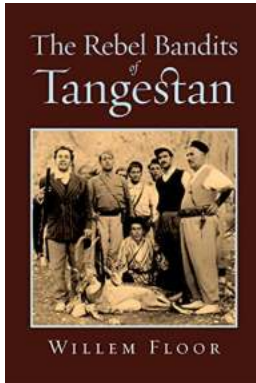
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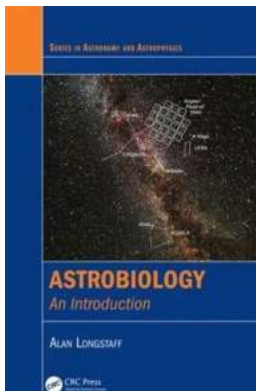
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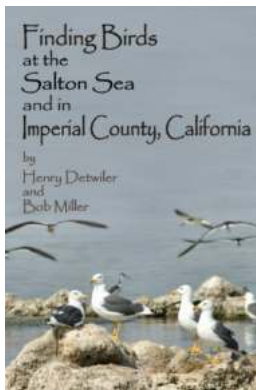
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