LECTURE NOTES IN PHYSICS

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(Eds.)

Granular Gas Dynamics

Granular Gas Dynamics, Thorsten PÐ“Â¶schel, Nikolai V. Brilliantov, Springer, 2003, 3540201106, 9783540201106, 366 pages. While there is not yet any general theory for granular materials, significant progress has been achieved for dilute systems, also called granular gases. The contributions in this book address both the kinetic approach one using the Boltzmann equation for dissipative gases as well as the less established hydrodynamic description. The last part of the book is devoted to driven granular gases and their analogy with molecular fluids. Care has been taken so as to present the material in a pedagogical and self-contained way and this volume will thus be particularly useful to nonspecialists and newcomers to the field..

An introduction to mathematical modelling , Neville D. Fowkes, John J. Mahony, 1994, Mathematics, 447 pages. Demonstrates the challenges & fascinations of mathematical modelling & enables students to develop the skills required to examine real life problems. The various techniques ....

Computer simulation of mesoscale phenomena transport in disordered media, temperature gradients and hydrodynamically interacting systems, Stefan Schwarzer, May 15, 2002, Science, 266 pages. .

Gas dynamics, Volume 2 , Maurice Joseph Zucrow, Joe D. Hoffman, Jun 1, 1985, , 494 pages. .

Linear and Nonlinear Waves , G. B. Whitham, Oct 18, 2011, Science, 660 pages. Now in an accessible paperback edition, this classic work is just as relevant as when it first appeared in 1974, due to the increased use of nonlinear waves. It covers the ....

The Physics of Granular Media , Haye Hinrichsen, Dietrich E. Wolf, Mar 6, 2006, Science, 364 pages. Despite extensive empirical experience, there is both a scientific challenge and a technological need to develop an understanding of the mechanisms underlying the flow of ....

Modelling and Numerics of Kinetic Dissipative Systems , Lorenzo Pareschi, Giovanni Russo, 2006, Science, 220 pages. The book is divided into three parts, which contain respectively recent results in the kinetic theory of granular gases, kinetic theory of chemically reacting gases, and ....

Mechanics of Granular Media , Aleksandr F. Revuzhenko, Jan 1, 2006, Science, 308 pages. This monograph provides a broad coverage of phenomena of deformation and machining of granular media. Granular matter consists of macroscopic particles of different size, shape ....

The Mathematical Theory of Non-uniform Gases An Account of the Kinetic Theory of Viscosity, Thermal Conduction and Diffusion in Gases, , 1970, Mathematics, 423 pages. This classic book, now reissued in paperback, presents a detailed account of the mathematical theory of viscosity, thermal conduction, and diffusion in non-uniform gases based ....

Introduction to nonequilibrium statistical mechanics , James A. McLennan, 1989, , 372 pages. .

Frontiers in modern plasma physics 2008 ICTP International Workshop on the Frontiers of Modern Plasma Physics, Trieste, Italy 14-25 July 2008, P. K. Shukla, Bengt Eliasson, Lennart Stenflo, International Centre for Theoretical Physics, 2008, Science, 304 pages. The main focus of the workshop was on tokamak physics and magnetic confinement fusion, plasma turbulence, dusty plasmas, intense laser-plasma interactions, plasma based ....

Granular Gases , Thorsten PÐ“Â¶schel, Stefan Luding, Mar 26, 2001, Science, 456 pages. "Granular Gases" are diluted many-particle systems in which the mean free path of the particles is much larger than the typical particle size, and where particle collisions ....

Îïèñàíèå: The study of kinetic equations related to gases, semiconductors, photons, traffic flow, and other systems has developed rapidly in recent years because of its role as a mathematical tool in

many applications in areas such as engineering, meteorology, biology, chemistry, materials science, nanotechnology, and pharmacy. Written by leading specialists in their respective fields, this book presents an overview of recent developments in the field of mathematical kinetic theory with a focus on modeling complex systems, emphasizing both mathematical properties and their physical meaning. The overall presentation covers not only modeling aspects and qualitative analysis of mathematical problems, but also inverse problems, which lead to a detailed assessment of models in connection with their applications, and to computational problems, which lead to an effective link of models to the analysis of real-world systems. The book is divided into three parts: Part I presents fundamental aspects of the Boltzmann equation; Part II deals with the modeling of semiconductor devices as well as related applications and computational topics; Part III covers a variety of applications in physics and the natural sciences, offering a range of very different conceivable developments of mathematical kinetic theory. The study of kinetic equations related to gases, semiconductors, photons, traffic flow, and other systems has developed rapidly in recent years because of its role as a mathematical tool in areas such as engineering, meteorology, biology, chemistry, materials science, nanotechnology, and pharmacy. Written by leading specialists in their respective fields, this book presents an overview of recent developments in the field of mathematical kinetic theory with a focus on modeling complex systems, emphasizing both mathematical properties and their physical meaning.

Îïèñàíèå: This monograph provides a comprehensive study about how a dilute gas described by the Boltzmann equation responds under extreme nonequilibrium conditions. This response is basically characterized by nonlinear transport equations relating fluxes and hydrodynamic gradients through generalized transport coefficients that depend on the strength of the gradients. In addition, many interesting phenomena (e.g. chemical reactions or other processes with a high activation energy) are strongly influenced by the population of particles with an energy much larger than the thermal velocity, what motivates the analysis of high-degree velocity moments and the high energy tail of the distribution function.The authors have chosen to focus on shear flows with simple geometries, both for single gases and for gas mixtures. This allows them to cover the subject in great detail. Some of the topics analyzed include:-Non-Newtonian or rheological transport properties, such as the nonlinear shear viscosity and the viscometric functions. -Asymptotic character of the Chapman-Enskog expansion. -Divergence of high-degree velocity moments. -Algebraic high energy tail of the distribution function. -Shear-rate dependence of the nonequilibrium entropy. -Long-wavelength instability of shear flows. -Shear thickening in disparate-mass mixtures. -Nonequilibrium phase transition in the tracer limit of a sheared binary mixture. -Diffusion in a strongly sheared mixture. The text can be read as a whole or can be used as a resource for selected topics from specific chapters.

Îïèñàíèå: An introduction for physics students and teachers to the historical development of the kinetic theory of gases, by providing a collection of the most important contributions by Clausius, Maxwell and Boltzmann, with introductory surveys explaining their significance. In addition, extracts from the works of Boyle, Newton, Mayer, Joule, Helmholtz, Kelvin and others show the historical context of ideas about gases, energy and irreversibility. In addition to five thematic essays connecting the classical kinetic theory with 20th-century topics such as indeterminism and interatomic forces, there is an extensive international bibliography of historical commentaries on kinetic theory, thermodynamics and so on, published during the previous four decades.

Îïèñàíèå: This monograph presents novel approaches and new results in fundamentals and applications related to rough sets and granular computing. It includes the application of rough sets to real world problems, such as data mining, decision support and sensor fusion. The relationship of rough sets to other important methods of data analysis â_" Bayes theorem, neurocomputing and pattern recognition is thoroughly examined. Another issue is the rough set based data analysis, including the study of decision making in conflict situations. Recent engineering applications of rough set theory are given, including a processor architecture organization for fast implementation of basic rough set operations and results concerning advanced image processing for unmanned aerial vehicles. New emerging areas of study and applications are presented as well as a wide spectrum of on-going research, which makes the book valuable to all interested in the field of rough set theory and granular computing.

Îïèñàíèå: 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. Modeling in Applied Sciences 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 * Beckerâ_"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.

Îïèñàíèå: This monograph gives a comprehensive description of the relationship and connections between kinetic theory and fluid dynamics, mainly for a time-independent problem in a general domain. Ambiguities in this relationship are clarified, and the incompleteness of classical fluid dynamics in describing the behavior of a gas in the continuum limitâ_"recently reported as the ghost effectâ_"is also discussed. The approach used in this work engages an audience of theoretical physicists, applied mathematicians, and engineers.By a systematic asymptotic analysis, fluid-dynamic-type equations and their associated boundary conditions that take into account the weak effect of gas rarefaction are derived from the Boltzmann system. Comprehensive information on the Knudsen-layer correction is also obtained. Equations and their boundary conditions are carefully classified depending on the physical context of problems. Applications are presented to various physically interesting phenomena, including flows induced by temperature fields, evaporation and condensation problems, examples of the ghost effect, and bifurcation of flows.Key features:* many applications and physical models of practical interest* experimental works such as the Knudsen compressor are examined to supplement theory* engineers will not be overwhelmed by sophisticated mathematical techniques* mathematicians will benefit from clarity of definitions and precise physical descriptions given in mathematical terms* appendices collect key derivations and formulas, important to the practitioner, but not easily found in the literatureKinetic Theory and Fluid Dynamics serves as a bridge for those working in different communities where kinetic theory or fluid dynamics is important: graduate students, researchers and practitioners in theoretical physics, applied mathematics, and various branches of engineering. The work can be used in graduate-level courses in fluid dynamics, gas dynamics, and kinetic theory; some parts of the text can be used in advanced undergraduate courses.

Îïèñàíèå: "Granular Gases" are diluted many-particle systems in which the mean free path of the particles is much larger than the typical particle size, and where particle collisions occur dissipatively. The dissipation of kinetic energy can lead to effects such as the formation of clusters, anomalous diffusion and characteristic shock waves to name but a few. The book is organized as follows: Part I comprises the rigorous theoretical results for the dilute limit. The detailed properties of binary collisions are described in Part II. Part III contains experimental investigations of granular gases. Large-scale behaviour as found in astrophysical systems is discussed in Part IV. Part V, finally, deals with possible generalizations for dense granular systems.

Îïèñàíèå: Kinetic Theory: Classical, Quantum, and Relativistic Descriptions goes beyond the scope of other works in the field with its thorough treatment of applications in a wide variety of disciplines. Its clear exposition and emphasis on concrete examples will make it not only an excellent graduate text but also a valuable resource for researchers in such disciplines as aerospace, mechanical, and chemical engineering; astrophysics, solid state and laser physics and devices, plasma physics, and controlled and thermonuclear fusion.Among the topics covered are:- The Liouville equation and analyses of the Liouville equation, including two independent derivations - The Boltzmann equation

and Boltzmann's H-theorem - Analysis of the linearized collision operator- Fluid dynamics and irreversibility- Assorted kinetic equations with applications to plasmas and neutral fluids- Elements of quantum kinetic theory, including the Green's-function formalism and the Wigner-Moyal equation- Relativistic kinetic theory and Lorentz invariants- Kinetic properties of metals and amorphous media- Monte-Carlo analysis in kinetic theory- Kinetic study of shock wavesThis third revised edition features a new section on constants of motion and symmetry and a new appendix on the Lorentz-Legendre expansion.Each chapter concludes with a variety of problems, many of which provide self-contained descriptions of related topics; lists of such "topical problems" are included in the Table of Contents. Numerous appendices supply vector formulas and tensor notation, properties of special functions, physical constants, references, and a historical time chart.

Îïèñàíèå: This monograph provides a broad coverage of phenomena of deformation and machining of granular media. Granular matter consists of macroscopic particles of various sizes, shapes, and surface properties leading to a typical behavior which is, on one hand, similar to fluids since they take the form of their repository and, on the other hand, similar to solids under deformation. This book analyses this typical behavior of granular media for soils, rocks and stones, metals and various synthetic materials. It presents a theoretical description, applications and the understanding of the basic phenomena characteristic of granular matter. Various mixing and intriguing pattern-formation processes in granular materials are presented by means of illustrative and original experiments and a concise theoretical development.

Îïèñàíèå: Avalanches, debris, mudflows and landslides are common and natural phenomena that occur worldwide, predominantly in mountainous regions. With an emphasis on snow avalanches, this book sets out to provide a survey and discussion about the motion of avalanche-like flows from initiation to run out. An important aspect of this book is the formulation and investigation of a simple but appropriate continuum mechanical model for the realistic prediction of geophysical flows of granular material. This will help the practitioners in the field to better understand the physical input and provide them with a tool for their work. Originating from many lectures the authors have given over the years, this instructive volume brings the reader to the forefront of research - an aim also supported by an extensive bibliogrpahy of almost 500 entries. Avalanche Dynamics should be accessible to, and is intended for, a broad readership of researchers, graduate students and practitioners with backgrounds in geophysics, geology, civil and mechanical engineering, applied mathematics and continuum physics.

Îïèñàíèå: While there is not yet any general theory for granular materials, significant progress has been achieved for dilute systems, also called granular gases. The contributions in this book address both the kinetic approach one using the Boltzmann equation for dissipative gases as well as the less established hydrodynamic description. The last part of the book is devoted to driven granular gases and their analogy with molecular fluids. Care has been taken so as to present the material in a pedagogical and self-contained way and this volume will thus be particularly useful to nonspecialists and newcomers to the field.

Îïèñàíèå: This book summarizes the results of a research programme financed by the "Deutsche Forschungsgemeinschaft" in the field of deformation and failure in granular and porous media. It presents the recent engineering as well as mathematical key aspects of this field for a broad community. Its main focus is on the dynamics response under large and catastrophic deformations, covering the fundamentals and dynamical processes of porous and granular materials as well as their related sub-scale and micro-mechanical effects.Special emphasis is placed on the modeling and theory of avalanches, debris and mud flows.

Îïèñàíèå: Most of the solid materials we use in everyday life, from plastics to cosmetic gels exist under a non-crystalline, amorphous form: they are glasses. Yet, we are still seeking a fundamental explanation as to what glasses really are and to why they form. In this book, we survey the most recent theoretical and experimental research dealing with glassy physics, from molecular to colloidal glasses and granular media. Leading experts in this field present broad and original perspectives on one of the deepest mysteries of condensed matter physics, with an emphasis on the key role played by heterogeneities in the dynamics on glassiness.

Îïèñàíèå: Sand, rice, sugar, snow, cement... Although ubiquitous in our daily lives, granular media still challenge engineers and fascinate researchers. This book provides the state-of-the-art of the physics of granular media and recent advances in the field. The book presents the fundamental properties of granular materials: interactions between grains; solid, liquid and gaseous behaviours; coupling with a fluid; and sediment transport and formation of geological structures. Descriptions of the phenomena combine qualitative and formal arguments, coming from areas as diverse as elasticity, plasticity, statistical physics, fluid mechanics and geomorphology. Many examples of the astonishing behaviours of granular media are presented, including avalanches, segregation, dune song and quicksand. This book is ideal for graduate students and researchers in physics, applied mathematics and engineering.

Îïèñàíèå: Granular or particulate materials arise in almost every aspect of our lives, including many familiar materials such as tea, coffee, sugar, sand, cement and powders. At some stage almost every industrial process involves a particulate material, and it is usually the cause of the disruption to the smooth running of the process. In the natural environment, understanding the behaviour of particulate materials is vital in many geophysical processes such as earthquakes, landslides and avalanches. This book is a collection of current research from some of the major contributors in the topic of modelling the behaviour of granular materials. Papers from every area of current activity are included, such as theoretical, numerical, engineering and computational approaches. This book illustrates the numerous diverse approaches to one of the outstanding problems of modern continuum mechanics. Reprinted from Journal of Engineering Mathematics, Vol. 52, Nos. 1-3, 2005

Îïèñàíèå: Computer simulations not only belong to the most important methods for the theoretical investigation of granular materials, but provide the tools that have enabled much of the expanding research by physicists and engineers. The present book is intended to serve as an introduction to the application of numerical methods to systems of granular particles. Accordingly emphasis is on a general understanding of the subject rather than on the presentation of latest advances in numerical algorithms. Although a basic knowledge of C++ is needed for the understanding of the numerical methods and algorithms in the book, it avoids usage of elegant but complicated algorithms to remain accessible for those who prefer to use a different programming language. While the book focuses more on models than on the physics of granular material, many applications to real systems are presented.

Krug and J. Kurchan, and they seek to report current experimental approaches with, importantly, a detailed account of new techniques. The volume should serve as a useful manual for all researchers, both novice and experienced, who wish to get quickly directed to open questions in key aspects of this challenging and topical domain.

Îïèñàíèå: How new are the high Tc superconductors, as compared to the conventional low Tc ones? In what sense are these oxides different from regular metals in their normal state? How different is the mechanism for high Tc superconductivity from the well-known electron-phonon interaction that explains so well superconductivity in metals and alloys? What are the implications of the new features of the high Tc oxides for their practical applications? This book aims to give some answers to those questions, drawing particularly on similarities between the high Tc oxides and granular superconductors, which also present a maximum of their critical temperature near the metal-insulator transition.

Îïèñàíèå: The modeling of granular and porous materials in science and engineering affects a variety of problems that arise from the need to describe successfully the behavior of materials that exist naturally in our surroundings. Indeed, the modeling process is a critical tool in analyzing and describing the microm chanics and behavior of granular and porous material experimentation. This work covers all major topics in modeling soil behavior, including transport phenomena, namely: mechanics of porous and granular media, flow and transport phenomena in particulate materials, and numerical simulation methods.

The key features: scientists from different backgrounds, namely engineers and mathematicians who

are interested in soil behavior, as well as experts in particulate material modeling, focus on the most important techniques and models currently in use, contributions are devoted to both the mathematical and engineering aspects of the subject and bring the reader to the frontiers of research, numerical models given for finite elastoplastic deformations. "Modeling and Mechanics of Granular and Porous Materials" is fairly unique in the literature. It may serve as both an excellent reference text or in seminars, appealing to graduate students, researchers and scientists in applied mathematics, continuum mechanics, finite element methods, solid mechanics, and hydraulics engineering.

Îïèñàíèå: This volume is a collection of articles from the proceedings of the ISSBMR 7th Course: Structure and Biophysics - New Technologies for Current Challenges in Biology and Beyond. This NATO Advanced Institute (ASI) was held in Erice at the Ettore Majorana Foundation and Centre for Scientific Culture on 22 June through 3 July 2005. The ASI brought together a diverse group of experts in the fields of Structural Biology, Biophysics and Physics. Prominent lecturers, from seven different countries, and students from around the world participated in the NATO ASI organized by Professors Joseph Puglisi (Stanford University, USA) and Alexander Arseniev (Moscow, RU). Advances in nuclear magnetic resonance spectroscopy (NMR) and x-ray crystallography have allowed the three-dimensional structures of many biological macromolecules and their complexes, including the ribosome and RNA polymerase to be solved. Fundamental principles of NMR spectroscopy and dynamics, x-ray crystallography, computation and experimental dynamics were taught in the context of important biological applications. The ASI addressed the treatment and detection of bioterrorism agents, and focused on critical partner country priorities in biotechnology, materials and drug discovery.The range of topics represent the diversity of critical problems between structural biology, biochemistry and biophysics, in which lies the fertile ground of drug development, biotechnology and new materials. The individual articles represent the state of the art in each area and provide a guide to the original literature in this rapidly developing field.

Îïèñàíèå: There is much scientific interest in ice because of its intriguing properties and because of its importance in the natural environment. This book, for scientists and engineers, describes the physical properties of ice, interprets them in terms of its molecular structure, and shows their relevance to the forms of ice found on Earth and in space.

Îïèñàíèå: Professor Dr. Marius Grundmann has studied physics at the Technical University Berlin. He has worked on the epitaxy and the characterization of electronic and optical properties of semiconductor heterostructures and nanostructures and devices made from them. Since 2000 he is professor for experimental physics at the University of Leipzig.

Îïèñàíèå: Learning solid state physics involves a certain degree of maturity, since it involves tying together diverse concepts from many areas of physics. The objective is to understand, in a basic way, how solid materials behave. To do this one needs both a good physical and mathematical background. One definition of solid state physics is that it is the study of the physical (e.g. the electrical, dielectric, magnetic, elastic, and thermal) properties of solids in terms of basic physical laws. In one sense, solid state physics is more like chemistry than some other branches of physics because it focuses on common properties of large classes of materials. It is typical that solid state physics emphasizes how physics properties link to electronic structure. We have retained the term solid state physics, even though condensed matter physics is more commonly used. Condensed matter physics includes liquids and non-crystalline solids such as glass, which we shall not discuss in detail. Modern solid state physics came of age in the late thirties and forties, and had its most extensive expansion with the development of the transistor, integrated circuits, and microelectronics. Most of microelectronics, however, is limited to the properties of inhomogeneously doped semiconductors. Solid state physics includes many other areas of course; among the largest of these are ferromagnetic materials, and superconductors. Just a little less than half of all working physicists are in condensed matter.

Holmes, PA - HEADstrong Foundation™ is proud to announce the event details and game schedules for the 7th Annual Nicholas Colleluori Fall Men's Classic. The two-day event will take place Saturday and Sunday, October 5-6th, 2013 at Ridley High School in Folsom, PA. The NCC is

held annually and is dedicated to remembering the life and legacy of HEADstrong founder Nicholas "HEAD" Colleluori while promoting the importance of community, brotherhood and sportsmanship within the game.