Book review


This book summarizes current knowledge of the optical properties of single small particles and natural light scattering media such as snow, clouds, foam, aerosols, etc. The book considers both single and multiple light scattering regime, together with light scattering and radiative transfer in closed-packed media. The main emphasis of the text is to introduce the modern approximate analytical methods utilised in light scattering optics. The authors derive simple equations which relate the size, shape and concentration of particles, and their optical constants, and intensity of the reflected, internal or transmitted light. Main definitions are first presented, followed by chapters devoted to scattering theory based on Maxwell’s equations, the approximate results of radiative transfer theory, and the complex problems of closed-packed media. In a separate chapter, he presents analytical solution for single and multiple scattering problems in a variety of practical applications, including light-scattering by natural media, image transfer, remote sensing and inverse problems, biological optics and planetary optics. The book concludes with a number of appendices and tables.


This report considers the current and possible future effects of aviation on the global atmosphere. The report considers all the gases and particles emitted by aircraft into the atmosphere and initiating the formation of contrails. The report then considers how all this can modify the radiative properties of the atmosphere, leading to climate change, and how it can modify the ozone layer, leading to changes in ultraviolet radiation reaching the Earth. The report also considers how potential changes in aircraft technology, air transport operations and the institutional regulatory and economic framework might affect emissions in the future. This volume, which is the second of five Special Reports to be prepared by the IPCC, provides accurate, unbiased, policy-relevant information to serve the aviation industry, policymakers, environmental organizations, and researchers in global change, atmospheric chemistry, and economics.

The geologic record contains evidence of greenhouse climates in the earth’s past, and by studying these, one can gain greater understanding of the forcing mechanisms and feedbacks that influence today’s climate. By examining several warm intervals of geologic time from the same perspectives (oceanic and terrestrial; theoretical and observational), the chapters in this book illuminate the difference and commonalities among various greenhouse climates. Thirty four experts in paleoclimatology combine in one integrated volume new and state-of-the-art paleontological, geological, and theoretical studies of intervals of global warmth. The book reviews what is known about the causes and consequences of globally warm climates, demonstrates current directions of research on warm climates, and outlines the central problems that remain unsolved. They present new research on a number of different warm climate intervals from the early Paleozoic to the early Cenozoic. The chapters also integrate a range of approaches, including paleoclimate simulations using coupled GCMs, paleoclimate reconstructions using paleontological and geochemical data, refinement of paleogeography, and the study of the effects of climate change on marine and terrestrial organisms.


Most natural and industrial flows are turbulent in whole or in part. The atmosphere and oceans, automobiles and aircraft engines, all provide examples of this ubiquitous phenomenon. In recent years, turbulence has become a very lively area of scientific research and application, attracting many newcomers who need a basic introduction to the subject. Turbulent flow offers a grounding in the subject of turbulence, developing both physical insight and the mathematical framework needed to express the theory. It begins with a review of the physical nature of turbulence, statistical tools, and space and time scales of turbulence. Basic theory is presented next, illustrated by examples of simple turbulent flows and developed through classical models of jets, wakes and boundary layers. A deeper understanding of turbulence dynamics is provided by spectral analysis and its applications. The final chapter introduces the numerical simulation of turbulent flows. This text will interest graduate students in mechanical, aerospace, chemical, and civil engineering, as well as in applied mathematics and the physical sciences. It will also be a useful reference for practicing engineers and scientists.


This textbook presents a broad coverage of atmospheric physics. It assumes a basic knowledge of undergraduate-level physics and mathematics but begins at a lower level than most other textbooks and shows how physics helps us to understand many important aspects of atmospheric behaviour. The book presents a thorough treatment of atmospheric thermodynamics, radiative transfer, atmospheric fluid dynamics and elementary atmospheric chemistry. Armed with an understanding of these topics, the interested student will be able to grasp the essential physics behind issues of current
concern, such as the amplification of the greenhouse effect and associated questions of climatic change, the Antarctic ozone hole and global depletion of ozone, as well as more familiar processes such as the formation of raindrops and the development of weather systems. This book is an introductory text for intermediate-to-advanced undergraduates studying atmospheric physics as part of physics, meteorology, and environmental science courses. It will also be useful for undergraduate students studying atmospheric physics for the first time for applied mathematics, physical chemistry, and engineering who have an interest in the atmosphere.


This book constitutes a high quality review of the basic principles of radiative transfer with up to date references. After a global presentation concerning the basic properties of radiation, atmosphere, and oceans, the first few chapters are dedicated to general notions intervening in the radiative processes, and the basic principles of radiative transfer are very well expressed. The main aspects of typical radiative transfer problems, such as multiple scattering, azimuthal dependence of the radiation field, radiative transfer in the atmosphere–ocean system, effects of surface reflection in the radiation field...with their mathematical solutions are clearly presented and analysed in the following chapter. Then all the typical calculation methods, such as discrete ordinate method, two-, three- and multi-stream approximations, doubling–adding method, Monte-Carlo method..., are well developed or briefly recalled and the authors insist on the validity of the approximations used. Next, typical applications are proposed; for example, the importance of the UV radiation with respect to photochemical and biological effects is clearly shown and well-documented. Other interesting chapters of this book concern the study of the transmission in spectrally complex media, and the radiative transfer, and the radiative transfer in nongray media. The role of radiation in climate and the analysis of the various potential forcings are well explained. Moreover, this book also contains numerous solved exercises and problems scattered in the different chapters. In conclusion, this book could become a reference in radiative transfer, and we must recommend it for all libraries related to atmospheric, oceanic, and environmental sciences, as well as for students and teachers.

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