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Wave Propagation in a Turbulent Medium Wave Propagation in a Turbulent Medium Wave propagation in a turbulent medium Wave Propagation in a Turbulent Medium Short-term Spot Size and Beam Wander in a Turbulent Medium Wave Propagation in a Turbulent Medium, Translated from the Russian The Propagation of Electromagnetic Waves Through a Turbulent Medium Statistical Theory of Light Propagation in a Turbulent Medium (Review). Far-field Intensity Distribution from a Diffracting Aperture in a Turbulent Medium Modelling Auto-ignition in a Turbulent Medium Time-dependent Autocorrelation Functions for the Light Scattered by a Turbulent Medium Wave Propagation in a Turbulent Medium Turbulence in Porous Media Effect of Slewing on the Frequency Spectrum of a Laser Beam in a Turbulent Medium Propagation in Turbulent Media The Effects of the Turbulent Atmosphere on Wave Propagation Triggered Star Formation in a Turbulent Interstellar Medium (IAU S237) Triggered Star Formation in a Turbulent Interstellar Medium (IAU S237) Frequency Spectrum of Optical Waves Propagating in a Moving Turbulent Atmosphere Turbulence and Related Phenomena Selected Papers on Turbulence in a Refractive Medium The Application of Invariant Modeling to the Calculation of Atmospheric Turbulence Effect of Slewing on the Frequency Spectrum of a Laser Beam in a Turbulent Medium Statistical Fluid Mechanics Laser Beam Propagation in the Atmosphere COHERENT LIGHT PROPAGATION THROUGH A TURBULENT ATMOSPHERE: MEASUREMENTS OF THE OPTICAL FILTER FUNCTION. The Moliere Approximation for Wave Propagation in Turbulent Media Time-Symmetry Breaking in Turbulent Multi-Particle Dispersion Turbulence in Porous Media The Theory of Turbulence Political Turbulence Turbulence and Nonlinear Dynamics in MHD Flows Nonlinear Random Waves and Turbulence in Nondispersive Media Turbulent Fluid Flow Turbulent Multiphase Flows with Heat and Mass Transfer Managing People in Small and Medium Enterprises in Turbulent Contexts Wave Propagation and Turbulent Media Orbital Angular Momentum States of Light How Small-to-Medium Enterprises Thrive and Survive in Turbulent Times Lecture Notes on Turbulence and Coherent Structures in Fluids, Plasmas and Nonlinear Media

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‘Turbulence in Porous Media’ introduces the reader to the characterisation of turbulent flow, heat and mass transfer in permeable media, including analytical data and a review of available experimental data. Such transport processes occurring a relatively high velocity in permeable media, are present in a number of engineering and natural flows. De Lemos has managed to compile, detail, compare and evaluate available methodologies for modelling simulating purposes, providing an essential tour for engineering students working within the field. - The hotly debated topic of heterogeneity and flow turbulence has never before been addressed in book format. - Offers an experimental approach to turbulence in porous media as it discusses disciplines that have been traditionally developed apart from each other. The hotly debated topic of heterogeneity and flow turbulence has never before been addressed in book format. Offers an experimental approach to turbulence in porous media as it discusses disciplines that have been traditionally developed apart from each other. New stars form in the dense turbulent gas clouds of galaxies, and the formation of these clouds is the subject of the IAU S237. This book is the most up-to-date review of all aspects of cloud and star formation, and one of the few compendiums available on ISM turbulence. Managing People in Small and Medium Enterprises in Turbulent Contexts explores a range of human resource management (HRM) issues specific to small and medium-sized enterprises (SMEs). Based on a series of research studies and secondary sources of data, the book’s primary aim is to contextualise HRM issues in SMEs operating in a variety of national economic contexts that are (or have recently experienced) a turbulent situation. SMEs are the backbone of these economies. It is therefore critical that we study HR practices and concepts within such enterprises. The book covers HR practices in SMEs, such as recruitment and selection, training and development, performance evaluation and employee relations, by focusing on three types of turbulent economies: emerging market economies in Asia, the Pacific, Africa and Latin America; transition economies of Central and Eastern Europe; and crisis contexts in Southern Europe. Managing People in Small and Medium Enterprises in Turbulent Contexts is a useful resource for organisations, practitioners, academics and scholars in the fields of HRM, employee engagement, small and medium business management and other related disciplines. The authors have calculated the short-term beam spread and beam wander of a laser beam propagating in a turbulent medium. These results have been used to calculate the probability that, due to beam wander, the beam will fail to hit a receiver aperture. How social media is giving rise to a chaotic new form of politics As people spend increasing proportions of their daily lives using social media, such as Twitter and Facebook, they are being invited to support myriad political causes by sharing, liking, endorsing, or downloading. Chain reactions caused by these tiny acts of participation form a growing part of collective action today, from neighborhood campaigns to global political movements. Political Turbulence reveals that, in fact, most attempts at collective action online do not succeed, but some give rise to huge mobilizations—even revolutions. Drawing on large-scale data generated from the Internet and real-world events, this book shows how mobilizations that succeed are unpredictable, unstable, and often unsustainable. To better understand this unruly new force in the political world, the authors use experiments that test how social media influence citizens deciding whether or not to participate. They show how different personality types react to social influences and identify which types of people are willing to participate at an early stage in a mobilization when there are few supporters or signals of viability. The authors argue that pluralism is the model of democracy that is emerging in the social media age—not the ordered, organized vision of early pluralists, but a chaotic, turbulent form of politics. This book demonstrates how data science and experimentation with social data can provide a methodological toolkit for understanding, shaping, and perhaps even predicting the outcomes of this democratic turbulence. A guide to the essential information needed to model and compute turbulent flows and interpret experiments and numerical simulations Turbulent Fluid Flow offers an authoritative resource to the theories and models encountered in the field of turbulent flow. In this book, the author – a noted expert on the subject – creates a complete picture of the essential information needed for engineers and scientists to carry out turbulent flow studies. This important guide puts the focus on the essential aspects of the subject – including modeling, simulation and the interpretation of experimental data - that fit into the basic needs of engineers that work with turbulent flows in technological design and innovation. Turbulent Fluid Flow offers the basic information that underpins the most recent models and techniques that are currently used to solve turbulent flow challenges. The book provides careful explanations, many supporting figures and detailed mathematical calculations that enable the reader to derive a clear understanding of turbulent fluid flow. This vital resource: • Offers a clear explanation to the models and techniques currently used to solve turbulent flow problems • Provides an up-to-date account of recent experimental and numerical studies probing the physics of canonical turbulent flows • Gives a self-contained treatment of the essential topics in the field of turbulence • Puts the focus on the connection between the subject matter and the goals of fluids engineering • Comes with a detailed syllabus and a solutions manual containing MATLAB codes, available on a password-protected companion website Written for fluids engineers, physicists, applied mathematicians and graduate students in mechanical, aerospace and civil engineering, Turbulent Fluid Flow contains an authoritative resource to the information needed to interpret experiments and carry out turbulent flow studies. Political and financial upheaval is not a new phenomenon – from the tulip bulb bubble in the Netherlands in the seventeenth century to Black Monday in 1987, businesses throughout history have worked to adapt and cope. However, today's climate is even more fraught with crises, raising the levels of concern for business, society, and governments. It especially poses a challenge for small businesses, who have to learn to cope with this increasingly turbulent environment, dealing with the difficulties and taking advantage of the new opportunities that turbulence can provide. Understanding how resilience capabilities can be developed to promote sustainable business is imperative. This book provides a new paradigm for conceptualizing resilience capabilities and advances current understanding both theoretically and practically in real-world business settings. Examining the processes of resilience during different phases of crisis reveals why businesses either fail, or outperform their counterparts during times of turbulence. Based on in-depth empirical research, researchers and advanced students in small business, strategic management and risk management will find this an invaluable guide to organizational resilience. A study was made concerning the statistical theory of light propagation in a turbulent medium. A parabolic equation which was examined was only valid when back scattering could be disregarded. The theory proposed uses the small value of the longitudinal scale of heterogeneities, as compared with other longitudinal scales of the problem. Many difficulties encountered in the range of strong fluctuations are eliminated in the new theory. This thesis presents experimental and theoretical investigations of the connection between the time asymmetry in the short-time evolution of particle clusters and the intrinsic irreversibility of turbulent flows due to the energy cascade. The term turbulence describes a special state of a continuous medium in which many interacting degrees of freedom are excited. One of the interesting phenomena observed in turbulent flows is their time irreversibility. When milk is stirred into coffee, for example, highly complex and interwoven structures are produced, making the mixing process irreversible. This behavior can be analyzed in more detail by studying the dispersion of particle clusters. Previous experimental and numerical studies on the time asymmetry in two-particle dispersion indicate that particles separate faster backwards than forwards in time, but no conclusive explanation has yet been provided. In this thesis, an experimental study on the short-time behavior of two- and four-particle dispersion in a turbulent water flow between two counter-rotating propellers is presented. A brief but rigorous theoretical analysis reveals that the observed time irreversibility is closely linked to the turbulence energy cascade. Additionally, it is demonstrated experimentally that the addition of minute amounts of polymers to the flow has a significant impact on multi-particle dispersion due to an alteration of the energy cascade. Orbital Angular Momentum States of Light provides an in-depth introduction to modelling of long-range propagation of orbital angular momentum (OAM) modes as well as more general structured light beams through atmospheric turbulence. Starting with angular spectrum method for diffraction and description of structured light states, the book discusses the technical details related to wave propagation through atmospheric turbulence. The review of historical as well as more recent ideas in this topical area, along with computer simulation codes, makes this book a useful reference to researchers and optical engineers interested in developing and testing of free-space applications of OAM states of light. Part of IOP Series in Advances in Optics, Photonics and Optoelectronics. In this report, the author discusses the effect of slewing on the temporal frequency spectrum of the scintillations of a laser beam propagating through a turbulent medium. It is assumed that the turbulent medium is characterized by the index of refraction n(r, t) = 1 + (n sub 1)(r, t), where the fluctuation (n sub 1) is much Topics discussed at this international workshop include: magnetic fields in astrophysical flows, slow and fast dynamos, MHD turbulence in space plasmas and in the laboratory, exact solutions to MHD, topology and chaos in MHD, helicity and velocity-magnetic correlations, turbulent reconnection and non-magnetic flows. This book is based on the lectures delivered at the 19th Canberra International Physics Summer School held at the Australian National University in Canberra (Australia) in January 2006.The problem of turbulence and coherent structures is of key importance in many fields of science and engineering. It is an area which is vigorously researched across a diverse range of disciplines such as theoretical physics, oceanography, atmospheric science, magnetically confined plasma, nonlinear optics, etc. Modern studies in turbulence and coherent structures are based on a variety of theoretical concepts, numerical simulation techniques and experimental methods, which cannot be reviewed effectively by a single expert.The main goal of these lecture notes is to introduce state-of-the-art turbulence research in a variety of approaches (theoretical, numerical simulations and experiments) and applications (fluids, plasmas, geophysics, nonlinear optical media) by several experts. A smooth introduction is presented to readers who are not familiar with the field, while reviewing the most recent advances in the area. This collection of lectures will provide a useful review for both postgraduate students and researchers new to the advancements in this field, as well as specialists seeking to expand their knowledge across different areas of turbulence research. New stars form in the dense turbulent gas clouds of galaxies. A wide variety of processes, with scales ranging from the size of a galaxy to the size of an individual star, drive interstellar turbulence and trigger dense cloud formation. The formation of these clouds is the subject of the IAU S237. This book is the most up-to-date review of all aspects of cloud and star formation. It summarizes the current state of understanding of triggered star formation in a turbulent interstellar medium. Topics covered range from observations and theory of turbulence in the ISM, to the formation of shells and young stars inside of shells, and molecular clouds, star clusters, and galaxies, all with a view toward understanding how star formation begins in these various environments. It is the first comprehensive overview of triggered star formation, and one of the few compendiums available on ISM turbulence. Numerous industrial systems or natural environments involve multiphase flows with heat and mass transfer. The authors of this book present the physical modeling of these flows, in a unified way, which can include various physical aspects and several levels of complexity. Thermal engineering and nuclear reactors; the extraction and transport of petroleum products; diesel and rocket engines; chemical engineering reactors and fluidized beds; smoke or aerosol dispersion; landslides and avalanches &? the modeling of multiphase flows with heat and mass transfer for all these situations can be developed following a common methodology. This book is devoted to the description of the mathematical bases of how to incorporate adequate physical ingredients in agreement with known experimental facts and how to make the model evolve according to the required complexity. Contents Part 1. Approach and General Equations 1. Towards a Unified Description of Multiphase Flows. 2. Instant Equations for a Piecewise Continuous Medium. 3. Description of a “Mean Multiphase Medium”. 4. Equations for the Mean Continuous Medium. Part 2. Modeling: A Single Approach Adaptable to Multiple Applications 5. The Modeling of Interphase Exchanges. 6. Modeling Turbulent Dispersion Fluxes. 7. Modeling the Mean Gas–Liquid Interface Area per Unit Volume. 8. “Large Eddy Simulation” Style Models. 9. Contribution of Thermodynamics of Irreversible Processes. 10. Experimental Methods. 11. Some Experimental Results Pertaining to Multiphase Flow Properties that Are Still Little Understood. Part 3. From Fluidized Beds to Granular Media 12. Fluidized Beds. 13. Generalizations for Granular Media. 14. Modeling of Cauchy Tensor of Sliding Contacts. 15. Modeling the Kinetic Cauchy Stress Tensor. Part 4. Studying Fluctuations and Probability Densities 16. Fluctuations of the Gas Phase in Reactive Two-Phase Media. 17. Temperature Fluctuations in Condensed Phases. 18. Study of the PDF for Velocity Fluctuations and Sizes of Parcels. About the Authors Roland Borghi is Professor Emeritus at Ecole Centrale Marseille in France and works as a consultant in the space, petrol and automobile sectors. His research activities cover fluid mechanics, combustion and flames, and multi-phase and granular flows. He was a member of the CNRS scientific committee and a laureate of the French Academy of Science. Fabien Anselmet is Professor at Ecole Centrale Marseille in France. His research activities focus on the turbulence of fluids and its varied applications in industry and in fields linked to the environment. With a unified, didactic style, this text presents tangible models of multiphase flows with heat and mass transfer with attention to various levels of complexities. It addresses thermal engineering and nuclear reactors, extraction and transport of petroleum products, diesel engines and rocket engines, chemical engineering reactors and fluidized beds, smoke or aerosol dispersion, and landslides and avalanches. Engineers, researchers, and scientists will appreciate the discussions of modeling principles, flows and granular media, and fluctuations around averages. This book presents some of the most important results concerning atmospheric turbulence and some of its effects on the propagation of a light beam. Atmospheric turbulence causes fluctuations in both the intensity and the phase of the beam and still must be understood and modelized for applications in photonics or environmental metrology. The future of free-space optical (FSO) communication through atmospheric turbulence channels is especially of interest and research on high bit-rate communications attracts more and more interest as an alternative to radio links because of bandwidth, spectrum, and security issues. Some of the current solutions for improving FSO communications are presented in this book. The authors have calculated the frequency spectrum of plane waves and beams propagating in a moving turbulent atmosphere. Both the case when the atmosphere moves with a constant wind and the case when the wind velocity is distributed according to a gaussian centered about some average velocity is considered. The results indicate that for small propagation distances, the frequency spectrum behaves as omega sup -8/3 for large frequency, omega; for large propagation distances, the spectrum is broadened with increasing distance-with the broadening dependent upon the beam parameters and the wind velocity. (Author). This monograph describes the phenomena associated with the propagation of electromagnetic and acoustic waves through atmospheric turbulence. Geared toward specialists in radiophysics and atmospheric acoustics and optics, the treatment is also suitable for advanced undergraduates and graduate students. The author stresses applications to phase and amplitude fluctuations, scintillation of stars, radio scattering, and other problems. Part I covers topics from the theory of random fields and turbulence theory, including statistical description. Part II, on the scattering of waves in the turbulent atmosphere, is supplemented by an appendix on scattering of acoustic radiation. Part III offers a detailed presentation of line-of-sight propagation of acoustic and electromagnetic waves through a turbulent medium. Part IV concludes the text with a comparison of theory with experimental data In this report, we have studied the effect of beam slewing on the amplitude and phase spectra of a laser beam propagating in a turbulent medium. Two He-Ne lasers operating at 6328 A have been utilized to make simultaneous measurements of the effects of scintillation over homogeneous optical paths of 650 and 1300 m to study the transfer of coherent radiation through a turbulent medium. At the path terminus, multiple sampling of each laser beam was effected using a photo-optical technique which records a 61-cm cross section of an optical beam. Concurrent with the optical data, wind-speed and direction recordings were made at multiple points along the optical path in order to estimate the homogeneity of meteorological conditions. Near the path terminus, measurements of wind shear and temperature lapse were taken. In addition, high-speed thermometry techniques were utilized to compute one- dimensional temperature spectra as well as the thermal structure coefficient CT. Data were gathered during temperature-lapse, neutral, and inversion conditions. Log-irradiance scans derived from the optical data were used to compute log- irradiance power spectra, variance, and other statistical quantities. Using these optical and meteorological data, optical filter functions were then calculated for spatial frequencies above 87 c/m and are used to compare with current theories. The saturation of the log-irradiance data is again observed, and the isotropy of the irradiance fluctuations is examined. In this report the author has reviewed the recent developments on beam propagation in a turbulent medium. These include the effect of the turbulence on beam intensity, spread, coherence, wander, angle of arrival, scintillation and distortion, as well as other related topics. Turbulence in Porous Media introduces the reader to the characterisation of turbulent flow, heat and mass transfer in permeable media, including analytical data and a review of available experimental data. Such transport processes occurring a relatively high velocity in permeable media are present in a number of engineering and natural flows. This new edition features a completely updated text including two new chapters exploring Turbulent Combustion and Moving Porous Media. De Lemos has expertly brought together a text that compiles, details, compares and evaluates available methodologies for modelling and simulating flow, providing an essential tour for engineering students working within the field as well as those working in chemistry, physics, applied mathematics, and geological and environmental sciences. Brings together groundbreaking and complex research on turbulence in porous media Extends the original model to situations including reactive systems Now discusses movement of the porous matrix With contributions by numerous experts "If ever a book on turbulence could be called definitive," declared Science, "it is this book by two of Russia's most eminent and productive scientists in turbulence, oceanography, and atmospheric physics." Noted for its clarity as well as its comprehensive treatment, this two-volume set serves as text or reference. 1975 edition. Given is an analysis of the effect of atmospheric turbulence in the Fraunhofer region on a near-horizontal beam of finite cross-section near the earth's surface. The far-field intensity distribution at optical frequencies of an initially plane wave from a finite, circular, source aperture is obtained as a function of range and angle for various values of the index structure constant. Describing the turbulence-induced index of refraction fluctuations by the Kolmogorov spectrum, it is found that the time average of the peak radiant intensity in the Fraunhofer region of a finite source aperture decreases with range at a much faster rate than the intensity calculated from absorption and scattering by molecules and particulate matter. Specifically, a beam from a 2-cm aperture at a wavelength of 0.6328 microns in moderate daytime turbulence will have an unscattered range of 5 km. For small values of the inner turbulence scale, the effects of turbulence are dominant over most of the ranges of interest. (Author). In January

1937, Nobel laureate in Physics Subrahmanyan Chandrasekhar was recruited to the University of Chicago. He was to remain there for his entire career, becoming Morton D. Hull Distinguished Service Professor of Theoretical Astrophysics in 1952 and attaining emeritus status in 1985. This is where his then student Ed Spiegel met him during the summer of 1954, attended his lectures on turbulence and jotted down the notes in hand. His lectures had a twofold purpose: they not only provided a very elementary introduction to some aspects of the subject for novices, they also allowed Chandra to organize his thoughts in preparation to formulating his attack on the statistical problem of homogeneous turbulence. After each lecture Ed Spiegel transcribed the notes and filled in the details of the derivations that Chandrasekhar had not included, trying to preserve the spirit of his presentation and even adding some of his side remarks. The lectures were rather impromptu and the notes as presented here are as they were set down originally in 1954. Now they are being made generally available for Chandrasekhar's centennial. A solution is presented to the wave propagation equation obtained by direct analogy from a method commonly used to solve the Schrodinger equation for high-energy potential scattering. In optical communications and related devices, the random variations in the received signal due to atmospheric turbulence can represent a severe limitation to system performance. Studies of these fluctuations have been based on solutions to the wave propagation equation that are correct only to the first order in the refractive index deviation. This memorandum demonstrates a solution that is correct to all orders in the refractive index deviation and to lowest order in the stationary phase approximation. Although the solution is readily extended to next order in stationary phase, such an extension is recognized in scattering theory as unwarranted since it neglects terms of the same order from outside the region of stationary phase. The conventional Born and Rytov solutions in propagation theory are of questionable validity since they represent approximations to the extended solution. (Author).