The Electromagnetic Spectrum Link Springer

This open access book marks the first historical overview of the autism rights branch of the neurodiversity movement, describing the activities and rationales of key leaders in their own words since it organized into a unique community in 1992. Sandwiched by editorial chapters that include critical analysis, the book contains 19 chapters by 21 authors about the forming of the autistic community and neurodiversity movement, progress in their influence on the broader autism community and field, and their possible threshold of the advocacy establishment. The actions covered are legendary in the autistic community, including manifestos such as "Don't Mourn for Us", mailing lists, websites or webpages, conferences, issue campaigns, academic project and journal, a book, and advisory roles. These actions have shifted the landscape toward viewing autism in social terms of human rights and identity to accept, rather than as a medical collection of deficits and symptoms to cure.
Electromagnetic Wave Propagation in Turbulence is devoted to a method for obtaining analytical solutions to problems of electromagnetic wave propagation in turbulence. In a systematic way the monograph presents the Mellin transforms to evaluate analytically integrals that are not in integral tables. Ample examples of application are outlined and solutions for many problems in turbulence theory are given. The method itself relates to asymptotic results that are applicable to a broad class of problems for which many asymptotic methods had to be employed previously.
Periodic magnetic structures (undulators) are widely used in accelerators to generate monochromatic undulator radiation (UR) in the range from far infrared to the hard X-ray region. Another periodic crystalline structure is used to produce quasimonochromatic polarized photon beams via the coherent bremsstrahlung mechanism (CBS). Due to such characteristics as monochromaticity, polarization and adjustability, these types of radiation is of large interest for applied and basic research of accelerator-emitted radiation. The book provides a detailed overview of the fundamental principles behind electromagnetic radiation emitted from accelerated charged particles (e.g. UR, CBS, radiation of fast electrons in Laser flash fields) as well as a unified description of relatively new radiation mechanisms which attracted great interest in recent years. This are the so-called polarization radiation excited by the Coulomb field of incident particles in periodic structures, parametric X-rays, resonant transition radiation and the Smith-Purcell effect. Characteristics of such radiation sources and perspectives of their usage are discussed. The recent experimental results as well as their interpretation are presented.
Observational AstrophysicsSpringer Science & Business Media
Theory and Applications to Communications, Geophysical Exploration, and Remote Sensing
Radio Wave Propagation for Telecommunication Applications
Electromagnetic Wave Scattering on Nonspherical Particles
A New Window to the Universe
Applications in Food and Agriculture
Reflection and Transmission of Electromagnetic, Particle and Acoustic Waves

Gravitational waves were first predicted by Albert Einstein in 1916, a year after the development of his new theory of gravitation known as the general theory of relativity. This theory established gravitation as the curvature of space-time produced by matter and energy. To be discernible even to the most sensitive instruments on Earth, the waves have to be produced by immensely massive objects like black holes and neutron stars which are rotating around each other, or in the extreme situations which prevail in the very early ages of the Universe. This book presents the story of the prediction of gravitational waves by Albert Einstein, the early attempts to detect the waves, the development of the LIGO detector, the first detection in 2016, the subsequent detections and their implications. All concepts are described in some detail, without the use of any mathematics and advanced physics which are needed for a full understanding of the subject. The book also contains description of electromagnetism, Einstein's special theory and general theory of relativity, white dwarfs, neutron stars and black holes and other concepts which are needed for understanding gravitational waves and their effects. Also described are the LIGO detectors and the cutting edge technology that goes into building them, and the extremely accurate measurements that are needed to detect gravitational waves. The book covers these ideas in a simple and lucid fashion which should be accessible to all interested readers. The first detection of gravitational waves was given a lot of space in the print and electronic media. So, the curiosity of the non-technical audience has been aroused about what gravitational waves really are and why they are so important. This book seeks to answer such questions.
Processing information and analyzing data efficiently and effectively is crucial for any company that wishes to stay competitive in its respective market. Nonlinear data presents new challenges to organizations, however, due to its complexity and unpredictability. The only technology that can properly handle this form of data is artificial neural networks. These modeling systems present a high level of benefits in analyzing complex data in a proficient manner, yet considerable research on the specific applications of these intelligent components is significantly deficient. Applications of Artificial Neural Networks for Nonlinear Data is a collection of innovative research on the contemporary nature of artificial neural networks and their specific implementations within data analysis. While highlighting topics including propagation functions, optimization techniques, and learning methodologies, this book is ideally designed for researchers, statisticians, academicians, developers, scientists, practitioners, students, and educators seeking current research on the use of artificial neural networks in diagnosing and solving nonparametric problems.
This book describes the physical mechanisms involved in the propagation of electromagnetic waves in the radiofrequency range, inside and outside buildings, in the terrestrial and near space environments, with a special focus on mobile radio communication. It combines a theoretical and an experimental approaches with an understanding of the physical environment through adequate formulations of the laws of electromagnetism. It should thus provide the background needed by advanced students and development engineers for the conception of high quality and reliable telecommunication systems.
This volume addresses the physical foundation of remote sensing. The basic grounds are presented in close association with the kinds of environmental targets to monitor and with the observing techniques. The book aims at plugging the quite large gap between the thorough and quantitative description of electromagnetic waves interacting with the Earth's environment and the user applications of Earth observation. It is intended for scientifically literate students and professionals who plan to gain a first understanding of remote sensing data and of their information content.
Theory and Applications
Foundations of the Mathematical Theory of Electromagnetic Waves
Theory and Practice
Gravitational Waves
Light Pollution and Its Effects on Science, Culture and Nature
The Electromagnetic Foundation of Remote Sensing

In this textbook a combination of standard mathematics and modern numerical methods is used to describe a wide range of natural wave phenomena, such as sound, light and water waves, particularly in specific popular contexts, e.g. colors or the acoustics of musical instruments. It introduces the reader to the basic physical principles that allow the description of the oscillatory motion of matter and classical fields, as well as resulting concepts including interference, diffraction, and coherence. Numerical methods offer new scientific insights and make it possible to handle interesting cases that can't readily be addressed using analytical mathematics; this holds true not only for problem solving but also for the description of phenomena. Essential physical parameters are brought more into focus, rather than concentrating on the details of which mathematical trick should be used to obtain a certain solution. Readers will learn how time-resolved frequency analysis offers a deeper understanding of the interplay between frequency and time, which is relevant to many phenomena involving oscillations and waves. Attention is also drawn to common misconceptions resulting from uncritical use of the Fourier transform. The book offers an ideal guide for upper-level undergraduate physics students and will also benefit physics instructors. Program codes in Matlab and Python, together with interesting files for use in the problems, are provided as free supplementary material.
This book deals with diffraction radiation, which implies the boundary problems of electromagnetic radiation theory. Diffraction radiation is generated when a charged particle moves near a target edge at a distance (- Lorentz factor, - wave length). Diffraction radiation of non-relativistic particles is widely used to design intense emitters in the cm wavelength range. Diffraction radiation from relativistic charged particles is important for noninvasive beam diagnostics and design of free electron lasers based on Smith-Purcell radiation which is diffraction radiation from periodic structures. Different analytical models of diffraction radiation and results of recent experimental studies are presented in this book. The book may also serve as guide to classical electrodynamics applications in beam physics and electrodynamics. It can be of great use for young researchers to develop skills and for experienced scientists to obtain new results.
This engaging text offers an accessible and clear treatment of the fundamentals of electromagnetics and optics, a core part of the standard undergraduate physics curriculum. Starting with static electric and magnetic fields, the book works through electromagnetic oscillations and the formation and propagation of electromagnetic waves, before moving on to geometric and wave optics, optical instrumentation and some discussion of new technologies in optics. The text is written from the experimental physics point of view, giving numerous real life examples and applications of devices. This highly motivating presentation deepens the knowledge in a very accessible way, carefully interweaving theory and practical applications. Students are guided through the material with well-chosen examples and case studies, and helpful chapter summaries are provided together with numerous exercises and detailed solutions, all intended to motivate and develop a well-founded understanding of the subject matter.
The theories and techniques that underlie radio interferometry as applied to astonomy and astrometry are discussed in this text. It is intended for graduate students and professionals who wish to use interferometric or synthesis-mapping techniques in astronomy, astrometry or geodesy.
Theory of Reflection
Electromagnetic Radiation of Electrons in Periodic Structures
X-Ray Diffraction
Interferometry and Synthesis in Radio Astronomy
Understanding Electromagnetic Waves
Research Anthology on Artificial Neural Network Applications

This research monograph presents a systematic treatment of the theory of the propagation of transient electromagnetic fields (such as optical pulses) through dielectric media which exhibit both dispersion and absorption. The work divides naturally into two parts. Part I presents a summary of the fundamental theory of the radiation and propagation of rather general electromagnetic waves in causal, linear media which are homogeneous and isotropic but which otherwise have rather general dispersive and absorbing properties. In Part II, we specialize on the propagation of a plane, transient electromagnetic field in a homogeneous dielectric. Although we have made some contributions to the fundamental theory given in Part I, most of the results of our own research appear in Part II. The purpose of the theory presented in Part II is to predict and to explain in explicit detail the dynamics of the field after it has propagated far enough through the medium to be in the mature-dispersion regime. It is the subject of a classic theory, based on the research conducted by A. Sommerfeld and L.
This book presents the concept of fractional dimensional space applied to the use of electromagnetic fields and waves. It provides demonstrates the advantages in studying the behavior of electromagnetic fields and waves in fractal media. The book presents novel fractional space generalization of the differential electromagnetic equations is provided as well as a new form of vector differential operators is formulated in fractional space. Using these modified vector differential operators, the classical Maxwell's electromagnetic equations are worked out. The Laplace's, Poisson's and Helmholtz's equations in fractional space are derived by using modified vector differential operators.
For the last twenty years astronomy has been developing dramatically. Until the nineteen-fifties, telescopes, spectrometers, and photographic plates consti tuted a relatively simple set of tools which had been refined to a high degree of perfection by the joint efforts of physicists and astronomers. Indeed these tools helped at the birth of modern astrophysics: the discovery of the expan sion of the Universe. Then came radioastronomy and the advent of electronics; the last thirty years have seen the application to astrophysics of a wealth of new experimental techniques, based on the most advanced fields of physics, and a constant interchange of ideas between physicists and astronomers. Last, but not least, modern computers have sharply reduced the burden of dealing with the information painfully extracted from the skies, whether from ever scarce photons, or from the gigantic data flows provided by satellites and large telescopes. The aim of this book is not to give an extensive overview of all the tech niques currently in use in astronomy, nor to provide detailed instructions for preparing or carrying out an astronomical project. Its purpose is methodologi cal: photons are still the main carriers of information between celestial sources and the observer. How we are to collect, sample, measure, and store this infor mation is the unifying theme of the book. Rather than the diversity of tech niques appropriate for each wavelength range, we emphasize the physical and mathematical bases which are common to all wavelength regimes.
Interest in the problem of interaction between radiation and astrophysical plasmas arose decades ago. Initially, this was closely related to the discovery of radio emission from the Sun and Galaxy which alerted theoretical radio astronomers to the problem of the origin of extra-terrestrial radio emission. It has been found that the observed radio emission from cosmic sources is generated by virtue of the mechanisms which work mainly in plasma (an ionized gas). Recently, the theory of generation and propagation of radiation in astrophysical plasmas has outgrown its parent domain of theoretical radio astronomy and is being successfully applied to other fields, such as high-energy astrophysics. General results obtained in this field may also help to better understand the complicated phenomena in laboratory plasmas on the Earth. At the same time, analysis of interaction between radiation and astrophysical plasmas under extreme conditions (strong magnetic fields of white dwarfs and neutron stars or strong gravitational fields in the vicinity of black holes) stimulates the development of plasma physics as a whole. In fact, the physics of plasma under extreme conditions in space is a new branch of fundamental science. The monograph contains the description of physical processes involved in interaction between radiation and astrophysical plasmas. It comprises the reasonable minimum necessary for understanding the emission and propagation of electromagnetic waves in astrophysical plasmas; without this minimum one could not succeed in interpreting the results of a number of astronomical observations. Audience: This monograph will be useful for graduate and post-graduate students and young scientists as a textbook on plasma astrophysics and the issues of plasma physics dealing with radiation. At the same time, the book can be used by specialists on astrophysics, radio astronomy and plasma physics.
Inverse Acoustic and Electromagnetic Scattering Theory
Patterns of Light
Magnetism
The Wonders of Light Phenomena
Theory of Reflection of Electromagnetic and Particle Waves
Visible and Invisible

The propagation of waves along and across the boundary between two media with different characteristic velocities is much more complicated when the source is on or near the boundary than when it is far away and the incident waves are plane. Examples of waves generated by localized sources near a boundary are the electromagnetic waves from the currents in a dipole on the surface of the earth and the seismic waves from a slip event in a fault in the earth's crust like the San Andreas fault in California. Both involve a type of surface wave that is called a lateral wave in electro magnetics and a head wave in seismology. Since the two are analogous and the latter is more easily visualized, it is conveniently used here to introduce and describe this important type of surface wave using the data of Y. Ben Zion and P. Malin ("San Andreas Fault Zone Head Waves Near Parkfield, CA," Science 251, 1592-1594, 29 March 1991).
This book begins by introducing magnetism and discusses magnetic properties of materials, magnetic moments of atoms and ions, and the elements important to magnetism. It covers magnetic susceptibilities and electromagnetic waves in anisotropic dispersive media among other topics. There are problems at the end of each chapter, many of which serve to expand or explain the material in the text. The bibliographies for each chapter give an entry to the research literature.
Artificial neural networks (ANNs) present many benefits in analyzing complex data in a proficient manner. As an effective and efficient problem-solving method, ANNs are incredibly useful in many different fields. From education to medicine and banking to engineering, artificial neural networks are a growing phenomenon as more realize the plethora of uses and benefits they provide. Due to their complexity, it is vital for researchers to understand ANN capabilities in various fields. The Research Anthology on Artificial Neural Network Applications covers critical topics related to artificial neural networks and their multitude of applications in a number of diverse areas including medicine, finance, operations research, business, social media, security, and more. Covering everything from the applications and uses of artificial neural networks to deep learning and non-linear problems, this book is ideal for computer scientists, IT specialists, data scientists, technologists, business owners, engineers, government agencies, researchers, academicians, and students, as well as anyone who is interested in learning more about how artificial neural networks can be used across a wide range of fields.
This open access book serves as textbook on the physics of the radiation belts surrounding the Earth. Discovered in 1958 the famous Van Allen Radiation belts were among the first scientific discoveries of the Space Age. Throughout the following decades the belts have been under intensive investigation motivated by the risks of radiation hazards they expose to electronics and humans on spacecraft in the Earth's inner magnetosphere. This textbook teaches the field from basic theory of particles and plasmas to observations which culminated in the highly successful Van Allen Probes Mission of NASA in 2012-2019. Using numerous data examples the authors explain the relevant concepts and theoretical background of the extremely complex radiation belt region, with the emphasis on giving a comprehensive and coherent understanding of physical processes affecting the dynamics of the belts. The target audience are doctoral students and young researchers who wish to learn about the physical processes underlying the acceleration, transport and loss of the radiation belt particles in the perspective of the state-of-the-art observations.
Applications of Artificial Neural Networks for Nonlinear Data
Radiation in Astrophysical Plasmas
Physics of Earth's Radiation Belts
The Electrodynamics of Water and Ice
Saving the Starry Night
Spin Waves

It has now been almost ten years since our first book on scattering theory ap peared [32]. At that time we claimed that "in recent years the development of integral equation methods for the direct scattering problem seems to be nearing completion, whereas the use of such an approach to study the inverse scattering problem has progressed to an extent that a 'state of the art' survey appears highly desirable". Since we wrote these words, the inverse scattering problem for acoustic and electromagnetic waves has grown from being a few theoreti cal considerations with limited numerical implementations to a weH developed mathematical theory with tested numerical algorithms. This maturing of the field of inverse scattering theory has been based on the realization that such problems are in general not only nonlinear but also improperly posed in the sense that the solution does not depend continuously on the measured data. This was emphasized in [32] and treated with the ideas and tools available at that time. Now, almost ten years later, these initial ideas have developed to the extent that a monograph summarizing the mathematical basis of the field seems appropriate. This

book is oUf attempt to write such a monograph. The inverse scattering problem for acoustic and electromagnetic waves can broadly be divided into two classes, the inverse obstacle problem and the inverse medium problem.
This book is written for scientists and engineers whose work involves wave reflec tion or transmission. Most of the book is written in the language of electromagnetic theory, but, as the title suggests, many of the results can be applied to particle waves, specifically to those satisfying the Schr6dinger equation. The mathematical connection between electromagnetic s (or TE) waves and quantum particle waves is established in Chapter 1. The main results for s waves are translated into quantum mechanical language in the Appendix. There is also a close analogy between acoustic waves and electromagnetic p (or TM) waves, as shown in Section 1-4. Thus the book, though primarily intended for those working in optics, microwaves and radio, will be of use to physicists, chemists and electrical engineers studying reflection and transmission of particles at potential barriers. The tech niques developed here can also be used by those working in acoustics, ocean ography and seismology. Chapter 1 is recommended for all readers: it introduces reflection phenomena, defines the notation, and previews (in Section 1-6) the contents of the rest of the book. This preview will not be duplicated here. We note only that applied topics do appear: two examples are the important phenomenon of attenuated total reflection in Chapter 8, and the reflectivity of multilayer dielectric mirrors in Chapter 12. The subject matter is restricted to linear classical electrodynamics in non-magnetic media, and the corresponding particle analogues.
This book provides a new, more accurate and efficient way for design engineers to understand electromagnetic theory and practice as it relates to the shielding of electrical and electronic equipment. The author starts by defining an electromagnetic wave, and goes on to explain the shielding of electromagnetic waves using the basic laws of physics. This is a new approach for the understanding of EMI shielding of barriers, apertures and seams. It provides a reliable, systematic approach that is easily understood by design engineers for the purpose of packaging the electrical and electronic systems of the future. This book covers both theory and practical application, emphasizing the use of transfer impedance to explain fully the penetration of an electromagnetic wave through an EMI gasketed seam. Accurate methods of testing shielding components such as EMI gaskets, shielded cables and connectors, shielded air vent materials, conductive glass and conductive paint are also covered. Describes in detail why the currently accepted theory of shielding needs improvement. Discusses the penetration of an electromagnetic wave through shielding barrier materials and electromagnetic interference (EMI) gasketed seams. Emphasizes the use of transfer impedance to explain the penetration of an electromagnetic wave through an EMI gasketed seam. The definition of an electromagnetic wave and how it is generated is included. Chapter in the book are included that reinforce the presented theory.
This book demonstrates how imaging techniques, applying different frequency bands from the electromagnetic spectrum, are used in scientific research. Illustrated with numerous examples this book is structured according to the different radiation bands: From Gamma-rays over UV and IR to radio frequencies. In order to ensure a clear understanding of the processing methodologies, the text is enriched with descriptions of how digital images are formed, acquired, processed and how to extract information from them. A special emphasis is given to the application of imaging techniques in food and agriculture research.
Chasing the Spectrum from Aristotle to LEDs
Theory and Observations
Integral Representations for Harmonic Problems
A Practical Approach
Understanding Earth Observation
Caustics, Catastrophes and Wave Fields

In this, the only book available to combine both theoretical and practical aspects of x-ray diffraction, the authors emphasize a "hands on" approach through experiments and examples based on actual laboratory data. Part I presents the basics of x-ray diffraction and explains its use in obtaining structural and chemical information. In Part II, eight experimental modules enable the students to gain an appreciation for what information can be obtained by x-ray diffraction and how to interpret it. Examples from all classes of materials -- metals, ceramics, semiconductors, and polymers -- are included. Diffraction patterns and Bragg angles are provided for students without diffractometers. 192 illustrations.
Neutron stars hold a central place in astrophysics, not only because they are made up of the most extreme states of the condensed matter, but also because they are, along with white dwarfs and black holes, one of the stable configurations that stars reach at the end of stellar evolution. Neutron stars posses the highest rotation rates and strongest magnetic fields among all stars. They radiate prolifically, in high energy electromagnetic radiation and in the radio band. This book is devoted to the selected lectures presented in the 6th NATO-ASI series entitled "The Electromagnetic Spectrum of Neutron Stars" in Marmaris, Turkey, on 7-18 June 2004. This ASI is devoted to the spectral properties of neutron stars. Spectral observations of neutron stars help us to understand the magnetospheric emission processes of isolated radio pulsars and the emission processes of accreting neutron stars. This volume includes spectral information from the neutron stars in broadest sense, namely neutrino and gravitational radiation along with the electromagnetic spectrum. We believe that this volume can serve as graduate level of text including the broad range of properties of neutron stars.
This text book gives a comprehensive account of magnetism, one of the oldest yet most vibrant fields of physics. It spans the historical development, the physical foundations and the continuing research underlying the subject. The book covers both the classical and quantum mechanical aspects of magnetism and novel experimental techniques. Perhaps uniquely, it discusses spin transport and magnetization dynamics phenomena associated with atomically and spin engineered nano-structures against the backdrop of spintronics and magnetic storage and memory applications. The book is for students, and serves as a reference for scientists in academia and research laboratories.
Acoustic and electromagnetic waves underlie a range of modern technology from sonar, radio, and television to microwave heating and electromagnetic compatibility analysis. This book, written by an international researcher, presents some of the research in a complete way. It is useful for graduate students in mathematics, physics, and engineering.
Imaging with Electromagnetic Spectrum
Electrodynamics and Optics
The Electromagnetic Spectrum of Neutron Stars
Electromagnetic Pulse Propagation in Casual Dielectrics
Diffraction Radiation from Relativistic Particles
Electromagnetic Fields and Waves in Fractional Dimensional Space

This book is a research monograph summarizing recent advances related to the molecular structure of water and ice, and it is based on the latest spectroscopic data available. A special focus is given to radio- and microwave frequency regions. Within the five interconnected chapters, the author reviews the electromagnetic waves interaction with water, ice, and moist substances, discussing the microscopic mechanisms behind the dielectric responses. Well-established classic views concerning the structure of water and ice are considered along with new approaches related to atomic and molecular dynamics. Particular attention is given to nanofluidics, atmospheric science, and electrochemistry. The mathematical apparatus, based on diverse approaches employed in condensed matter physics, is widely used and allows the reader to quantitatively describe the electrodynamic response of water and ice in both bulk and confined states. This book is intended for a wide audience covering physicists, electrochemists, geophysicists, engineers, biophysicists, and general scientists who work on the electromagnetic radiation interaction with water and moist substances.
The rapid growth of gemological sciences and mineralogy demands a dictionary such as this for gemologists, mineralogists, geologists, jewel dealers, industry and hobbyists. With some 16,000 comprehensive definitions, supplemented by more than 250 diagrams and figures, this is a one-stop reference to any matter dealing with gems and gemology.
This book deals with the reflection of electromagnetic and particle waves by interfaces. The interfaces can be sharp or diffuse. The topics of the book contain absorption, inverse problems, anisotropy, pulses and finite beams, rough surfaces, matrix methods, numerical methods, reflection of particle waves and neutron reflection. Exact general results are presented, followed by long wave reflection, variational theory, reflection amplitude equations of the Riccati type, and reflection of short waves. The Second Edition of the Theory of Reflection is an updated and much enlarged revision of the 1987 monograph. There are new chapters on periodically stratified media, ellipsometry, chiral media, neutron reflection and reflection of acoustic waves. The chapter on anisotropy is much extended, with a complete treatment of the reflection and transmission properties of arbitrarily oriented uniaxial crystals. The book gives a systematic and unified treatment reflection and transmission of electromagnetic and particle waves at interfaces. It is intended for physicists, chemists, applied mathematicians and engineers, and is written in a simple direct style, with all necessary mathematics explained in the text.
This book is a first-year graduate text on electromagnetic fields and waves. It is the translated and revised edition of the Chinese version with the same title published by the Publishing House of Electronic Industry (PHEI) of China in 1994. The text is based on the graduate course lectures on "Advanced Elec trodynamics" given by the authors at Tsinghua University. More than 300 students from the Department of Electronic Engineering and the Depart ment of Applied Physics have taken this course during the last decade. Their particular fields are microwave and millimeterwave theory and technology, physical electronics, optoelectronics and engineering physics. As the title of the book shows, the texts and examples in the book concentrate mainly on electromagnetic theory related to microwaves and optoelectronics, or light wave technology. However, the book can also be used as an intermediate-level text or reference book on electromagnetic fields and waves for students and scientists engaged in research in neighboring fields.
Basic Methodology and Simulations
Autistic Community and the Neurodiversity Movement
Stories from the Frontline
Dictionary of Gems and Gemology
Acoustic and Electromagnetic Equations

This one-semester textbook teaches students Electromagnetic Waves, via an early introduction to Maxwell’s Equations in the first chapter. Mathematics fundamentals are used as needed, but rigor is de-emphasized in preference to understanding the basic ideas and principles of EM waves. Each chapter includes extensive, step-by-step, solved examples, as well as abundant exercises. Designed for a one-semester course in electromagnetic waves; Introduces Maxwell’s equations in the first chapter; De-emphasizes mathematical rigor in order to make key ideas and principles easy to understand; Makes material accessible to readers of varying backgrounds, with extensive use of solved examples; Includes abundant exercises for each chapter.
This book gives a detailed overview of the theory of electromagnetic wave scattering on single, homogeneous, but nonspherical particles. Beside the systematically developed Green’s function formalism of the first edition this second and enlarged edition contains additional material regarding group theoretical considerations for nonspherical particles with boundary symmetries, an iterative T-matrix scheme for approximate solutions, and two additional but basic applications. Moreover, to demonstrate the advantages of the group theoretical approach and the iterative solution technique, the restriction to axisymmetric scatterers of the first edition was abandoned.
Light phenomena have intrigued humankind since prehistory. Think of the rainbow, a sunset on the sea, a game of shadows. Humans have always used light for their own needs, from cooking food to illuminating a room. However, light is not only limited to what we can see with our eyes. The invisible part of the electromagnetic spectrum is broad and dynamic. This book outlines the mysteries and wonders of electromagnetism, heat, and light. It also covers the history of our scientific understanding of light. The dark as well as the bright sides of light are fully explored in these pages, from their impact on our world to their use in cutting-edge technologies in a variety of fields. Numerous full-color images and drawings complement the text, and light phenomena are explained in a simple and engaging way.
Any student or engineer working in optics or the field of laser technology will find this a fascinating read. The book begins by addressing the properties of light as seen in the everyday world: events such as refraction in a pool, lenses in the form of glasses, the colors of objects, and atmospheric events. Latter chapters explain these events at the atomic and subatomic level and address the use of electron and optical microscopy in observing the worlds unseen by the unaided eye. Exercises and activities will be found in an appendix, but the primary volume can stand alone if the reader so desires.
Electromagnetic Wave Propagation in Turbulence
Observational Astrophysics
Lateral Electromagnetic Waves
Physics of Oscillations and Waves
Shielding of Electromagnetic Waves
Electromagnetic Theory for Microwaves and Optoelectronics
Caustics, Catastrophes and Wave Fields in a sense continues the treatment of the earlier volume 6 "Geometrical Optics of Inhomogeneous Media" in the present book series, by analysing caustics and their fields on the basis of modern catastrophe theory. This volume covers the key generalisations of geometrical optics related to caustic asymptotic expansions: The Lewis-Kravtsov method of standard functions, Maslov's method of caonical operators, Orlov's method of interference integrals, as well as their modifications for penumbra, space-time, random and other types of caustics. All the methods are amply illustrated by worked problems concerning relevant wave-field applications.
With use of Matlab and Python
From Fundamentals to Nanoscale Dynamics
Evaluation and Application of Mellin Transforms