ELECTROMAGNETIC WAVES

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Tour of the Electromagnetic Spectrum-Ginger Butcher 2010

Electromagnetic Waves-Carlo G. Someda 2017-12-19 Adapted from a successful and thoroughly field-tested Italian text, the first edition of Electromagnetic Waves was very well received. Its broad, integrated coverage of electromagnetic waves and their applications forms the cornerstone on which the author based this second edition. Working from Maxwell's equations to applications in optical communications and photonics, Electromagnetic Waves, Second Edition forges a link between basic physics and real-life problems in wave propagation and radiation. Accomplished researcher and educator Carlo G. Someda uses a modern approach to the subject. Unlike other books in the field, it surveys all major areas of electromagnetic waves in a single treatment. The book begins with a detailed treatment of the mathematics of Maxwell's equations. It follows with a discussion of polarization, delves into propagation in various media, devotes four chapters to guided propagation, links the concepts to practical applications, and concludes with radiation, diffraction, coherence, and radiation statistics. This edition features many new and reworked problems, updated references and suggestions for further reading, a completely revised appendix on Bessel functions, and new definitions such as antenna effective height. Illustrating the concepts with examples in every chapter, Electromagnetic Waves, Second Edition is an ideal introduction for those new to the field as well as a convenient reference for seasoned professionals.

Electromagnetic Wave Propagation, Radiation, and Scattering-Akira Ishimaru 2017-09-05 One of the most methodical treatments of electromagnetic wave propagation, radiation, and scattering—including new applications and ideas Presented in two parts, this book takes an analytical approach on the subject and emphasizes new ideas and applications used today. Part one covers fundamentals of electromagnetic wave propagation, radiation, and scattering. It provides ample end-of-chapter problems and offers a 90-page solution manual to help readers check and comprehend their work. The second part of the book explores up-to-date applications of electromagnetic waves—including radiometry, geophysical remote sensing and imaging, and biomedical and signal processing applications. Written by a world renowned authority in the field of electromagnetic research, this new edition of Electromagnetic Wave Propagation, Radiation, and Scattering: From Fundamentals to Applications presents detailed applications with useful appendices, including mathematical formulas, Airy function, Abel's equation, Hilbert transform, and Riemann surfaces. The book also features newly revised material that focuses on the following topics: Statistical wave theories—which have been extensively applied to topics such as geophysical remote sensing, bio-electromagnetics, bio-optics, and bio-ultrasound imaging Integration of several distinct yet related disciplines, such as statistical wave theories, communications, signal processing, and time reversal imaging New phenomena of multiple scattering, such as coherent scattering and memory effects Multiphysics applications that combine theories for different physical phenomena, such as seismic coda waves, stochastic wave theory, heat diffusion, and temperature rise in biological and other media Metamaterials and solitons in optical fibers, nonlinear phenomena, and porous media Primarily a textbook for graduate courses in electrical engineering, Electromagnetic Wave Propagation, Radiation, and Scattering is also ideal for graduate students in bioengineering, geophysics, ocean engineering, and geophysical remote sensing. The book is also a useful reference for engineers and scientists working in fields such as geophysical remote sensing, bio-medical engineering in optics and ultrasound, and new materials and integration with signal processing.

Electromagnetic Waves and Lasers-Wayne D. Kimura 2017-12-08 This book reviews basic electromagnetic (EM) wave theory and applies it specifically to lasers in order to give the reader not only tangible examples of how the theory is manifested in real life, but also practical knowledge about lasers, and their operation and usage. The latter can be useful for those involved with using lasers. As a short treatise on this subject matter, this book is not intended to dwell deeply into the details of EM waves nor lasers. A bibliography is provided for those who wish to explore in more depth the topics covered in this book. Rather the aim of this book is to offer a quick overview, which will allow the reader to gain a competent general understanding of EM waves and lasers.

Theory of Electromagnetic Wave Propagation-Charles Herach Papas 1965 Interfacing physics and electrical engineering, this graduate-level text reveals the inherent simplicity of the basic ideas of electromagnetic wave propagation and antennas and their logical development from Maxwell field equations. Topics include radiation from monochromatic sources in unbounded regions, electromagnetic waves in a plasma medium, Doppler effect, much more. 1965 edition.

Electromagnetic Waves-Vitaliy Zhurbenko 2011-06-21 This book is dedicated to various aspects of electromagnetic wave theory and its applications in science and technology. The covered topics include the fundamental physics of electromagnetic waves, theory of electromagnetic wave propagation and scattering, methods of computational analysis, material characterization, electromagnetic properties of plasma, analysis and applications of periodic structures and waveguide components, and finally, the biological effects and medical applications of electromagnetic fields.

Radiation and Propagation of Electromagnetic Waves-George Tyras 2013-10-22 Radiation and Propagation of Electromagnetic Waves serves as a text in electrical engineering or electrophysics. The book discusses the electromagnetic theory; plane electromagnetic waves in homogenous isotropic and anisotropic media; and plane electromagnetic waves in inhomogenous stratified media. The text also describes the spectral representation of elementary electromagnetic sources; the field of a dipole in a stratified medium; and radiation in anisotropic plasma. The properties and the procedures of Green's function method of solution, axial currents, as well as cylindrical boundaries are also considered. The book further tackles diffraction by cylindrical structures and apertures on cylindrical structures. Students taking electrical engineering or electrophysics will find the book useful.

Acoustic and Electromagnetic Waves-Douglas Samuel Jones 1989 From a mathematical point of view, acoustics and electromagnetism exhibit similar phenomena and are tackled with the same kind of technique. Jones's exhaustive study is unique in providing a unified treatment of the two fields, bringing out their common and disparate features and showing how they cross-fertilize one another. The book is designed so that the reader with an familiarity with either Maxwell's Equations or the equation of sound waves in fluid dynamics can follow the developments in both fields without difficulty. This is a comprehensive treatment which will provide a needed reference for researchers in applied mathematics and mathematical physics but also caters to the student, who is taken up to the frontiers of research with the help of appropriate exercises. Engineers with any sort of mathematical competence, particularly electrical engineers and those concerned with communications technology, will have to have access to it.

Classical Electromagnetic Radiation-Mark A. Heald 2012-12-19 Newly corrected, this highly acclaimed text is suitable foradvanced physics courses. The authors present a very accessiblemacroscopic view of classical electromagnetics thatemphasizes integrating electromagnetic theory with physicaloptics. The survey follows the historical development ofphysics, culminating in the use of four-vector relativity tofully integrate electricity with magnetism.Corrected and emended reprint of the Brooks/Cole ThomsonLearning, 1994, third edition.

Electromagnetic Surface Waves-John Polo 2013-05-31 For decades, the surface-plasmon-polariton wave guided by the interface of simple isotropic materials dominated the scene. However, in recent times research on electromagnetic surface waves guided by planar interfaces has expanded into new and exciting areas. In the 1990's research focused on advancing knowledge of the newly discovered Dyakonov wave. More recently, much of the surface wave research is motivated by the proliferation of nanotechnology and the growing number of materials available with novel properties. This book leads the reader from the relatively simple surface-plasmon-polariton wave with isotropic materials to the latest research on various types of electromagnetic surface waves guided by the interfaces of complex materials enabled by recent developments in nanotechnology. This includes:

Dyakonov waves guided by interfaces formed with columnar thin films, Dyakonov-Tamm waves guided by interfaces formed with sculptured thin films, and multiple modes of surface-plasmon-polariton waves guided by the interface of a metal and a periodically varying dielectric material. Gathers research from the past 5 years in a single comprehensive view of electromagnetic surface waves. Written by the foremost experts and researchers in the field. Layered presentation explains topics with an introductory overview level up to a highly technical level.

Electromagnetic Waves-Oliver Heaviside 1889

Electromagnetic Fields and Waves-Vladimir Rojansky 2012-03-08 This comprehensive introduction to classical electromagnetic theory covers the major aspects, including scalar fields, vectors, laws of Ohm, Joule, Coulomb, Faraday, Maxwell's equation, and more. With numerous diagrams and illustrations.

Biological Effects of Electromagnetic Waves-Curtis C. Johnson 1977

Electromagnetic Waves, Materials, and Computation with MATLAB-Dikshitulu K. Kalluri 2016-04-19 Readily available commercial software enables engineers and students to perform routine calculations and design without necessarily having a sufficient conceptual understanding of the anticipated solution. The software is so user-friendly that it usually produces a beautiful colored visualization of that solution, often camouflaging the fact that t

Scattering of Electromagnetic Waves-Leung Tsang 2004-04-07 A timely and authoritative guide to the state of the art of wavescattering Scattering of Electromagnetic Waves offers in three volumes acomplete and up-to-date treatment of wave scattering by randomdiscrete scatterers and rough surfaces. Written by leadingscientists who have made important contributions to wave scatteringover three decades, this new work explains the principles, methods,and applications of this rapidly expanding, interdisciplinaryfield. It covers both introductory and advanced material andprovides students and researchers in remote sensing as well asimaging, optics, and electromagnetic theory with a one-stopreference to a wealth of current research results. Plus, Scatteringof Electromagnetic Waves contains detailed discussions of bothanalytical and numerical methods, including cutting-edge techniquesfor the recovery of earth/land parametric information. The three volumes are entitled respectively Theories andApplications, Numerical Simulation, and Advanced Topics. In thesecond volume, Numerical Simulations, Leung Tsang (University ofWashington) Jin Au Kong (MIT), Kung-Hau Ding (Air Force ResearchLab), and Chi On Ao (MIT) cover: * Layered media simulations * Rough surface and volume scattering simulations * Dense media models and simulations * Electromagnetic scattering by discrete scatterers and a buriedobject * Scattering by vertical cylinders above a surface * Electromagnetic waves scattering by vegetation * Computational methods and programs used for performing varioussimulations

Refraction, Attenuation, and Backscattering of Electromagnetic Waves in the Troposphere-V. J. Falcone 1970

Electromagnetic Waves in Stratified Media-James R. Wait 2013-10-22 International Series of Monographs in Electromagnetic Waves, Volume 3: Electromagnetic Waves in Stratified Media provides information pertinent to the electromagnetic waves in media whose properties differ in one particular direction. This book discusses the important feature of the waves that enables communications at global distances. Organized into 13 chapters, this volume begins with an overview of the general analysis for the electromagnetic response of a plane stratified medium comprising of any number of parallel homogeneous layers. This text then explains the reflection of electromagnetic waves from planar stratified media. Other chapters consider the oblique reflection of plane electromagnetic waves from a continuously stratified medium. This book discusses as well the fundamental theory of wave propagation around a sphere. The final chapter deals with the theory of propagation in a spherically stratified medium. This book is a valuable resource for electrical engineers, scientists, and research workers.

Advanced Electromagnetic Waves-Saad Bashir 2015-11-18 This book endeavors to give the reader a strong base in the advanced theory of electromagnetic waves and its applications, while keeping pace with research in various other disciplines that apply electrostatics/electrodynamics theory. The treatment is highly mathematical, which tends to obscure the principles involved.

Planets And Electromagnetic waves-Dr. C. Ganesa Moorthy & G. Udhaya Sankar Dr. C. Ganesa Moorthy & G. Udhaya Sankar 2018-08-23 Explanations have been given for some breakthroughs in fundamental physics, more specifically in the theory of electromagnetic waves. First breakthrough: Only one of the waves, electric field wave and magnetic field wave, emerges as component of an electromagnetic wave. Second breakthrough: All electrons in any rotating planet cause the existence of the magnetic field in the planet. Third breakthrough: Rotating velocity, orbital velocity, escape velocity, and critical velocity are the major factors for existence of atmospheres and winds in planets. Fourth breakthrough: Maximum possible diameter of molecules in our universe may be at most of order 10 power (-7) meters. Explanations have been given with many figures.

Geospace Electromagnetic Waves and Radiation-James W. LaBelle 2006-02-21 The contributions gathered in this volume provide introductions to current problems in geospace electromagnetic radiation, guides to the associated literature and tutorial reviews of the relevant space physics. Students and scientists working on various aspects of the terrestrial aurora or magnetospheric and near-Earth heliospheric high-frequency waves will find this volume an indispensable companion for their studies.

Electromagnetic Waves-R K Shevgaonkar 2005-10-01

Infrared and Millimeter Waves-Kenneth J. Button 1983

Parabolic Equation Methods for Electromagnetic Wave Propagation-Mireille Levy 2000 Parabolic equation methods, used to analyze radiowave propagation in radar and radio communication systems, have become the dominant tool for assessing clear-air and terrain effects on propagation. This volume introduces the mathematical background to parabolic equation modelling and describes simple parabolic equation algorithms before progressing to more advanced topics, including domain truncation, impedance boundaries and the implementation of fast hybrid methods combining ray-tracing and parabolic equation techniques. The text's self-contained approach is suited to graduate students and researchers with little experience of radiowave propagation.

Electromagnetic Vibrations, Waves, and Radiation-George Bekefi 1977 The book describes the features that vibrations and waves of all sorts have in common and includes examples of mechanical, acoustical, and optical manifestations of these phenomena that unite various parts of physics. The main emphasis, however, is on the oscillatory aspects of the electromagnetic field--that is, on the vibrations, waves, radiation, and the interaction of electromagnetic waves with matter. This text was developed over a five-year period during which its authors were teaching the subject. It is the culmination of successful editions of class notes and preliminary texts prepared for their one-semester course at MIT designed for sophomores majoring in physics but taken by students from other departments as well. The book describes the features that vibrations and waves of all sorts have in common and includes examples of mechanical, acoustical, and optical manifestations of these phenomena that unite various parts of physics. The main emphasis, however, is on the oscillatory aspects of the electromagnetic field--that is, on the vibrations, waves, radiation, and the interaction of electromagnetic waves with matter. The content is

designed primarily for the use of second or third year students of physics who have had a semester of mechanics and a semester of electricity and magnetism. The aim throughout is to provide a mathematically unsophisticated treatment of the subject, but one that stresses modern applications of the principles involved. Descriptions of devices that embody such principles--such as seismometers, magnetrons, thermo-nuclear fusion experimental configurations, and lasers--are introduced at appropriate points in the text to illustrate the theoretical concepts. Many illustrations from astrophysics are also included.

Electromagnetic Waves 1-Pierre-Noël Favennec 2021-05-11 Electromagnetic Waves 1 examines Maxwell's equations and wave propagation. It presents the scientific bases necessary for any application using electromagnetic fields, and analyzes Maxwell's equations, their meaning and their resolution for various situations and material environments. These equations are essential for understanding electromagnetism and its derived fields, such as radioelectricity, photonics, geolocation, measurement, telecommunications, medical imaging and radio astronomy. This book also deals with the propagation of electromagnetic, radio and optical waves, and analyzes the complex factors that must be taken into account in order to understand the problems of propagation in a free and confined space. Electromagnetic Waves 1 is a collaborative work, completed only with the invaluable contributions of Ibrahima Sakho, Hervé Sizun and JeanPierre Blot, not to mention the editor, Pierre-Noël Favennec. Aimed at students and engineers, this book provides essential theoretical support for the design and deployment of wireless radio and optical communication systems.

Shielding of Electromagnetic Waves-George M. Kunkel 2019-07-11 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.

Electromagnetic Fields and Waves-Magdy F. Iskander 2000-04-01

Ionospheric Radio-Kenneth Davies 1990 This introductory text replaces two earlier publications (Davies 1965, 1969). Among the topics: characteristics of waves and plasma, the solar-terrestrial system, the Appleton formula, radio soundings of the ionosphere, morphology of the ionosphere, oblique propagation, importance of amplitude and phase, earth-space propagation. Annotation copyrighted by Book News, Inc., Portland, OR

The Scattering of Light and Other Electromagnetic Radiation-Milton Kerker 2016-06-03 The Scattering of Light and other Electromagnetic Radiation covers the theory of electromagnetic scattering and its practical applications to light scattering. This book is divided into 10 chapters that particularly present examples of practical applications to light scattering from colloidal and macromolecular systems. The opening chapters survey the physical concept of electromagnetic waves and optics. The subsequent chapters deal with the theory of scattering by spheres and infinitely long cylinders. These topics are followed by discussions on the application of light scattering to the determination of the size distribution of colloidal particles. The last chapters are devoted to the Rayleigh-Debye scattering and the scattering by liquids, as well as the concept of anisotropy. These chapters also describe the effect upon light scattering of partial orientation of anisotropic particles in electrical and magnetic fields and in viscous flow. This book is of value to physical chemists and physical chemistry researchers, teachers, and students.

Mechanical and Electromagnetic Vibrations and Waves-Tamer Bécherrawy 2013-05-10 Dealing with vibrations and waves, this text aims to provide understanding of the basic principles and methods of analysing various physical phenomena. The content includes the general properties of propagation, a detailed study of mechanical (elastic and acoustic) and electromagnetic waves, propagation, attenuation, dispersion, reflection, interference and diffraction of waves. It features chapters on the effect of motion of sources and observers (both classical and relativistic), emission of electromagnetic waves, standing and guided waves and a final chapter on de Broglie waves constitutes an introduction to quantum mechanics.

Assessment of the Possible Health Effects of Ground Wave Emergency Network-National Research Council 1993-02-01 Written at the request of the U.S. Air Force and Congress, this book evaluates the potential health effects associated with deployment of the Ground Wave Emergency Network (GWEN), a communications system to be used in case of a high-altitude detonation of a nuclear device. The committee, composed of experts in biophysics, physics, risk assessment, epidemiology, and cancer, examines data from laboratory and epidemiologic studies of effects from electromagnetic fields to determine the likelihood of health effects being caused by the operation of a fully implemented GWEN system.

Electromagnetic Waves-Umran S. Inan 2000 This book includes - how electromagnetic concepts are important to modern electrical engineering applications; more examples and problems than competing books; footnotes and biographies; an intuitive and progressive approach; vovers topics in order of increasing complexity; emphasis on physical understanding and clarity - without sacrificing rigor and completeness; detailed examples, selected application examples, abundant illustrations, and numerous end-of-chapter problems emphasizing practical applications; historical notes, abbreviated biographies, and hundreds of footnotes.

Principles of Electromagnetic Waves and Materials-Dikshitulu K. Kalluri 2016-04-19 Principles of Electromagnetic Waves and Materials is a condensed version of the author's previously published textbook, Electromagnetic Waves, Materials, and Computation with MATLAB. This book focuses on lower-level courses, primarily senior undergraduate and graduate students in electromagnetic waves and materials courses. It takes an integrative

Geometrical Theory of Diffraction for Electromagnetic Waves-Graeme L. James 1986 Geometrical Theory of Diffraction for Electromagnetic Waves

Electromagnetic Wave Theory-J. C. Brown 2016-01-21 International Series of Monographs in Electromagnetic Waves, Volume 11: Electromagnetic Wave Theory, Part 1 covers the proceedings of an International Scientific Radio Union (U.R.S.I.) Symposium on Electromagnetic Wave Theory. The book contains 61 chapters that are organized into three sections. The first section presents papers about wave propagation, which includes lateral waves; terrestrial waveguides; and plane waves in dissipative media. Next, the title reviews studies about wave guides, including basic properties of periodic waveguides; theoretical investigation of non-uniform waveguides; and waves in a coaxial line partially filled with plasma. The last section covers topics about surface waves, such as a dielectric prism in the corner of overmoded waveguide; lasers and optical communication systems; and microwave and laser resonators. The text will be of great use to researchers and practitioners of disciplines that study or utilize electromagnetic wave technologies, such as electrotechnics and electrical engineering.

Principles of Electromagnetic Waves and Materials-Dikshitulu K. Kalluri 2017-11-14 This book focuses primarily on senior undergraduates and graduates in Electromagnetics Waves and Materials courses. The book takes an integrative approach to the subject of electromagnetics by supplementing quintessential "old school" information and methods with instruction in the use of new commercial software such as MATLAB. Homework problems, PowerPoint slides, an instructor's manual, a solutions manual, MATLAB downloads, quizzes, and suggested examination problems are included. Revised throughout, this new edition includes two key new chapters on artificial electromagnetic materials and electromagnetics of moving media.

Electromagnetic Wave Interactions-Ardᵉshir Guran 1996 This book is a collection of papers on electromagnetic wave mechanics and its applications written by experts in this field. It offers the reader a sampling of exciting research areas in this field. The topics include polarimetric imaging, radar spectroscopy, surface or creeping waves, bistatic radar scattering, the Seebeck affect. Mathematical methods include inverse scattering theory, singularity expansion method, mixed potential integral equation, method of moments, and diffraction theory. Applications include Cellular Mobile Radios (CMR), radar target identification, and Personal Communication Services (PCS). This book shows how electromagnetic wave theory is currently being utilized and investigated. It involves a modicom of mathematical physics and will be of interest to researchers and graduate students in electrical engineering, physics and applied mathematics.

Wave Propagation Concepts for Near-Future Telecommunication Systems-Sandra Costanzo 2017-05-03 Wave Propagation Concepts for Near-Future Telecommunication Systems is an edited book discussing recent researches for the development of innovative telecommunication systems, with particular focus on the propagation aspects and radiating systems design. It is divided into two sections: Section 1, devoted to the illustration of advanced results in terms of microwave propagation at high operating frequencies, and Section 2, illustrating new electromagnetic concepts and applications.

Electromagnetic Waves-Rudolph Ernest Langer 1962

Elastic Scattering of Electromagnetic Radiation-Subodh Kumar Sharma 2018-01-29 The technique of elastic scattering of electromagnetic radiation has been used as a diagnostic tool in various disciplines of science,engineering,medicine and agriculture.The investigations relating to above problems may be divided in three categories:(i)Scattering by a single particle,(ii)Scattering by a tenuous system of uncorrelated scatterers and (iii)Scattering by a concentrated dispersion of scatterers.In the proposed book,the primary effort is to examine the analytic solutions of the scattering problems of types (i) and (ii) in diverse backgrounds.For the completeness of the book,analytic solutions in scattering situations of type (iii) are also covered in reasonable details.