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Electromagnetic Fields and Waves Field Theory of Guided Waves **Fields, Waves and Transmission Lines** Problems and Solutions on Electromagnetism **Advanced Electromagnetic Wave Propagation Methods Acoustic Fields and Waves in Solids** *Colliding Plane Waves in General Relativity* **Solutions and Applications of Scattering, Propagation, Radiation and Emission of Electromagnetic Waves** *Electromagnetic Fields and Waves in Fractional Dimensional Space* **A Solution for the Wave Velocity Field Existing on an Underwater Portion of an Impervious Sloping Breakwater Solutions to Problems of Controlling Long Waves with the Help of Micro-structure Tools** Analysis of Electromagnetic Fields and Waves *University Physics* **Acoustic fields and waves in solids** *Waves in Neural Media* Analysis of Electromagnetic Fields and Waves *Electromagnetic Waves Terrestrial Propagation of Long Electromagnetic Waves* **Physics of Continuous Media** *Electromagnetic Fields and Waves in Fractional Dimensional Space* **Radio Science Fields, Waves and Transmission Lines Engineering Electromagnetic Fields and Waves Fundamentals of Electromagnetics for Electrical and Computer Engineering** Introduction to Wave Phenomena *Waves in Neural Media* **Introduction to Vibrations and Waves** *Electromagnetism and the Structure of Matter Shock Waves - Proceedings Of The 20th International Symposium (In 2 Volumes)* **Plane-Wave Theory of Time-Domain Fields** *Physics-Doklady* **Waves in Focal Regions Localized Waves Mathematical Methods for Oscillators and Waves** Scattering of Electromagnetic Waves by Obstacles Alfvén Waves and Static Fields in Magnetosphere/ionosphere Coupling Large Time Behavior of Solutions for General Quasilinear Hyperbolic-Parabolic Systems of Conservation Laws *Radiation and Scattering of Waves* **Oscillations and Waves Electromagnetic Waves**

Fields, Waves and Transmission Lines Jan 13 2021 One of us (FAB) published a book Problems in Electronics with Solutions in 1957 which became well established and ran to five editions, the last revised and enlarged edition appearing in 1976. When the first edition was written it covered almost the complete undergraduate electronics courses in engin eering at universities. One book, at a price students can afford, can no longer cover an undergraduate course in electronics. It has therefore been decided to produce a book covering one important section of such a course using the experience gained and a few problems from previous editions of Problems in Electronics with Solutions. The book is based largely on problems collected by us over many years and given to undergraduate electronic and electrical engineers. Its purpose is to present the problems, together with a large number of their solutions, in the hope that it will prove valuable to undergraduates and other teachers. It should also be useful for Master's degree students in electronic and electrical engineering and physics, research workers, engineers and scientists in industry and as a reference source.

Electromagnetic Waves Jun 17 2021 For courses in Electromagnetic Fields & Waves. Electromagnetic Waves continues the applied approach used in the authors' successful Engineering Electromagnetics. The second book is appropriate for a second course in Electromagnetics that covers the topic of waves and the application of Maxwell's equations to electromagnetic events.

Shock Waves - Proceedings Of The 20th International Symposium (In 2 Volumes) Jun 05 2020

Oscillations and Waves Jul 27 2019 This book is an updated and modified translation of the Russian edition of 1984. In the present edition, certain sections have been abridged (in particular, Sects. 6.1 and 8.3) and the bibliography has been expanded. There are more detailed discus sions of the group properties of integrable systems of equations of mathematical physics (Sect. 3.4) and of the Riemannian problem in the context of the infinite dimensional internal symmetry groups of these systems of equations. There is an extended discussion of the reasons for the acceleration and retardation of pulsars in connection with more recent achievements of X-ray astronomy. Part of the material of Chap. 8 of the Russian edition has been included in Chap. 7; thus the number of chapters has been reduced to seven. S. Chandrasekhar set for me an example of brilliant analytical penetration into the essence of physical problems, and my book touches on his work in many in stances. The results of modem quantum theories of strong fields are not presented, but they can be found in the fundamental monographs Quantwn Electrodynamics of Strong Fields by W. Greiner, B. Muller, J. Rafelski (Sprioger-Verlag, Berlin, Heidelberg, New York 1985) and Quantwn Effects in Intense External Fields [in Russian] by A. Grib, S. Mamaev, W. Mostepanenko (Energoatomizdat, Moscow 1988). This book was translated by Dr. N. M. Queen; I am very grateful to him. I thank sincerely H. Latta, C.-D. Bachem, V. Rehman, S. von Kalckreuth for preparing of the english manuscript.

Waves in Focal Regions Mar 03 2020 Using numerous mathematical and numerical techniques of diffraction theory, Waves in Focal Regions: Propagation, Diffraction and Focusing of Light, Sound and Water Waves provides a full and richly illustrated description of waves in focal regions. Unlike most books, the author treats electromagnetic, acoustic, and water waves in one comprehensive volume. After an introductory section, the book describes approximate diffraction theories and efficient numerical methods to study the focusing of various kinds of waves. It then covers the physical interpretation of the theories, their accuracy, and the computational savings obtained, emphasizing uniform asymptotic results that remain valid in the vicinity of shadow boundaries and caustics. The next part deals with the focusing of scalar waves, including thorough theoretical analyses and detailed contour maps of diffraction patterns in focal regions for a variety of

different system parameters, such as f-number, Frensel number, aperture shape, amplitude distribution, and wavefront aberration. The author proceeds to explore the diffraction and focusing of electromagnetic waves. First solutions are derived for fields radiated by sources, reflected and refracted at plane interfaces, or diffracted by apertures in plane screens, and then these solutions are applied to study the focusing in homogeneous media and through a plane dielectric interface. In both cases, the author includes many computed results of the electromagnetic field distribution near focus. Presenting both theoretical and experimental results, the following part examines the focusing of sound and water waves by means of zone-plate lenses. The book concludes with a detailed study of the diffraction and focusing of water waves and a comparison of the results of both linear and nonlinear theories with those of experiments.

Field Theory of Guided Waves Oct 02 2022 "Co-published with Oxford University Press Long considered the most comprehensive account of electromagnetic theory and analytical methods for solving waveguide and cavity problems, this new Second Edition has been completely revised and thoroughly updated -- approximately 40% new material!Packed with examples and applications FIELD THEORY OF GUIDED WAVES provides solutions to a large number of practical structures of current interest. The book includes an exceptionally complete discussion of scalar and Dyadic Green functions. Both a valuable review and source of basic information on applied mathematical topics and a hands-on source for solution methods and techniques, this book belongs on the desk of all engineers working in microwave and antenna systems!" Sponsored by: IEEE Antennas and Propagation Society

Electromagnetic Fields and Waves in Fractional Dimensional Space Mar 15 2021 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.

A Solution for the Wave Velocity Field Existing on an Underwater Portion of an Impervious Sloping Breakwater Jan 25 2022

Terrestrial Propagation of Long Electromagnetic Waves May 17 2021 Terrestrial Propagation of Long Electromagnetic Waves deals with the propagation of long electromagnetic waves confined principally to the shell between the earth and the ionosphere, known as the terrestrial waveguide. The discussion is limited to steady-state solutions in a waveguide that is uniform in the direction of propagation. Wave propagation is characterized almost exclusively by mode theory. The mathematics are developed only for sources at the ground surface or within the waveguide, including artificial sources as well as lightning discharges. This volume is comprised of nine chapters and begins with an introduction to the fundamental concepts of wave propagation in a planar and curved isotropic waveguide. A number of examples are presented to illustrate the effects of an anisotropic ionosphere. The basic equations are summarized and plane-wave reflection from a dielectric interface is considered, along with the superposition of two obliquely incident plane waves. The properties of waveguide boundaries are implicitly represented by Fresnel reflection coefficients. Subsequent chapters focus on boundaries of the terrestrial guide; lightning discharges as a natural source of extremely-low-frequency and very-low-frequency radiation; and the mode theory for waves in an isotropic spherical shell. This book will be a useful resource for students and practitioners of physics.

Advanced Electromagnetic Wave Propagation Methods Jun 29 2022 This textbook provides a solid foundation into many approaches that are used in the analysis of advanced electromagnetic wave propagation problems. The techniques discussed are essential to obtain closed-form solutions or asymptotic solutions and meet an existing need for instructors and students in electromagnetic theory. The book covers various advanced mathematical methods used in the evaluation of the electromagnetic fields in rectangular, cylindrical and spherical geometries. The mathematics of special functions (i.e., Bessel, Hankel, Airy, Legendre, Error, etc.) are covered in depth, including appropriate Appendices. The author takes particular care to provide detailed explanations of auxiliary potentials, Hertz's vectors, Debye potentials, as well as the use of Green functions, the Watson transformation and the method of steepest descent in the solution of electromagnetic problems. Overall, Advanced Electromagnetic Wave Propagation Methods is a good source for the many skills required in obtaining closed form and asymptotic solution, which in many instances cannot be obtained using computer codes of Maxwell's equations. Thus, it provides an excellent training for preparing graduate students in their research work. This book is intended for a graduate course in electromagnetic theory for students in electrical engineering. Students in physics and professionals will also find it appropriate and useful. Provides a comprehensive and unified treatment of radiation and propagation problems Presents a detailed explanation in the use of Green functions, the Watson transformation and the method of steepest descent as they apply to electromagnetic problems Demonstrates various advanced mathematical techniques used in the evaluation of the electromagnetic fields Details how to formulate and obtain a closed-form solution or an asymptotic solution Includes appendices for Bessel, Legendre, Airy and Error functions

Solutions and Applications of Scattering, Propagation, Radiation and Emission of Electromagnetic Waves Mar 27 2022 In this book, a wide range of different topics related to analytical as well as numerical solutions of problems related to scattering, propagation, radiation, and emission in different medium are discussed. Design of several devices and their measurements aspects are introduced. Topics related to microwave region as well as Terahertz and quasi-optical region are considered. Bi-isotropic metamaterial in optical region is investigated. Interesting numerical methods in frequency domain and time domain for scattering, radiation, forward as well as reverse problems and microwave imaging

are summarized. Therefore, the book will satisfy different tastes for engineers interested for example in microwave engineering, antennas, and numerical methods.

Electromagnetic Fields and Waves in Fractional Dimensional Space Feb 23 2022 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.

Large Time Behavior of Solutions for General Quasilinear Hyperbolic-Parabolic Systems of Conservation Laws Sep 28 2019 We are interested in the time-asymptotic behavior of solutions to viscous conservation laws. Through the pointwise estimates for the Green's function of the linearized system and the analysis of coupling of nonlinear diffusion waves, we obtain explicit expressions of the time-asymptotic behavior of the solutions. This yields optimal estimates in the integral norms. For most physical models, the viscosity matrix is not positive definite and the system is hyperbolic-parabolic, and not uniformly parabolic. This implies that the Green's function may contain Dirac [lowercase Greek]Delta-functions. When the corresponding inviscid system is non-strictly hyperbolic, the time-asymptotic state contains generalized Burgers solutions. These are illustrated by applying our general theory to the compressible Navier-Stokes equations and the equations of magnetohydrodynamics.

University Physics Oct 22 2021 "University Physics is a three-volume collection that meets the scope and sequence requirements for two- and three-semester calculus-based physics courses. Volume 1 covers mechanics, sound, oscillations, and waves. This textbook emphasizes connections between theory and application, making physics concepts interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. Frequent, strong examples focus on how to approach a problem, how to work with the equations, and how to check and generalize the result."--Open Textbook Library.

Scattering of Electromagnetic Waves by Obstacles Nov 30 2019 Electromagnetic (EM) wave scattering is of fundamental importance to antenna and radar design engineering, and the increasing interest in metamaterials has created a need for new approaches to solving scattering problems for characterizing engineered media. This book lays the theoretical foundation for new computer programs in computational electromagnetics (CEM) and meets the need of today s researchers. This book represents over 30 years of the author s experience teaching this topic, with extensive lectures notes expanded to include advanced concepts and mathematical solutions to cover moderneffects on metamaterials and related advanced complexities.Problems and solutions at the end of each chapter help to reinforce concepts and highlight applications. This is an ideal text for advanced graduate students and researchers in EM and applied physics."

Alfvén Waves and Static Fields in Magnetosphere/ionosphere Coupling Oct 29 2019 Perturbation electric and magnetic fields carry in excess of 10(exp10) to 10(exp12) W of electrical power between the magnetosphere and high-latitude ionosphere. Most of this power is generated by the solar wind. The ionosphere at large spatial and temporal scales acts as a dissipative slab which can be characterized by its height-integrated Pedersen conductivity sigma p, so that the power flux into the ionosphere due to a quasi-static electric field E is given by sigma (pE2) The energy transferred to the ionosphere by time-varying electromagnetic fields in the form of Alfven waves is more difficult to calculate because density and conductivity gradients can reflect energy. Thus, field resonances and standing wave patterns affect the magnitude and altitude distribution of electrical energy dissipation. We use a numerical model to calculate the frequency-dependent electric field reflection coefficient of the ionosphere and show that the ionosphere does not behave as a simple resistive slab for electric field time scales less than a few seconds. Time variation of spacecraft-measured high-latitude electric and perturbation magnetic fields is difficult to distinguish from spatial structuring that has been Doppler-shifted to a non-zero frequency in the spacecraft frame. However, by calculating the frequency-dependent amplitude and phase relations between fluctuating electric and magnetic fields we are able to show that low frequency fields (

Waves in Neural Media Aug 20 2021 Waves in Neural Media: From Single Neurons to Neural Fields surveys mathematical models of traveling waves in the brain, ranging from intracellular waves in single neurons to waves of activity in large-scale brain networks. The work provides a pedagogical account of analytical methods for finding traveling wave solutions of the variety of nonlinear differential equations that arise in such models. These include regular and singular perturbation methods, weakly nonlinear analysis, Evans functions and wave stability, homogenization theory and averaging, and stochastic processes. Also covered in the text are exact methods of solution where applicable. Historically speaking, the propagation of action potentials has inspired new mathematics, particularly with regard to the PDE theory of waves in excitable media. More recently, continuum neural field models of large-scale brain networks have generated a new set of interesting mathematical questions with regard to the solution of nonlocal integro-differential equations. Advanced graduates, postdoctoral researchers and faculty working in mathematical biology, theoretical neuroscience, or applied nonlinear dynamics will find this book to be a valuable resource. The main prerequisites are an introductory graduate course on ordinary differential equations or partial differential equations, making this an accessible and unique contribution to the field of mathematical biology.

Problems and Solutions on Electromagnetism Jul 31 2022 Electrostatics - Magnetostatic field and quasi-stationary electromagnetic fields - Circuit analysis - Electromagnetic waves - Relativity, particle-field interactions.

Fundamentals of Electromagnetics for Electrical and Computer Engineering Nov 10 2020 Fundamentals of

Electromagnetics for Electrical and Computer Engineering, First Edition is appropriate for all beginning courses in electromagnetics, in both electrical engineering and computer engineering programs. This is ideal for anyone interested in learning more about electromagnetics. Dr. N. Narayana Rao has designed this compact, one-semester textbook in electromagnetics to fully reflect the evolution of technologies in both electrical and computer engineering. This book's unique approach begins with Maxwell's equations for time-varying fields (first in integral and then in differential form), and also introduces waves at the outset. Building on these core concepts, Dr. Rao treats each category of fields as solutions to Maxwell's equations, highlighting the frequency behavior of physical structures. Next, he systematically introduces the topics of transmission lines, waveguides, and antennas. To keep the subject's geometry as simple as possible, while ensuring that students master the physical concepts and mathematical tools they will need, Rao makes extensive use of the Cartesian coordinate system. Topics covered in this book include: uniform plane wave propagation; material media and their interaction with uniform plane wave fields; essentials of transmission-line analysis (both frequency- and time-domain); metallic waveguides; and Hertzian dipole field solutions. Material on cylindrical and spherical coordinate systems is presented in appendices, where it can be studied whenever relevant or convenient. Worked examples are presented throughout to illuminate (and in some cases extend) key concepts; each chapter also contains a summary and review questions. (Note: this book provides a one-semester alternative to Dr. Rao's classic textbook for two-semester courses, Elements of Engineering Electromagnetics, now in its Sixth Edition.)

Analysis of Electromagnetic Fields and Waves Nov 22 2021 The Method of Lines (MOL) is a versatile approach to obtaining numerical solutions to partial differential equations (PDEs) as they appear in dynamic and static problems. This method, popular in science and engineering, essentially reduces PDEs to a set of ordinary differential equations that can be integrated using standard numerical integration methods. Its significant advantage is that the analysis algorithms follow the physical wave propagation and are therefore efficient. This is because the fields on the discretisation lines are described by generalised transmission line (GTL) equations. With this formulation we have a connection to the well known transmission line theory and resulting in an easy understanding. The method of lines is a very accurate and powerful way to analyze electromagnetic waves, enabling a full-wave solution without the computational burden of pure finite element or finite difference methods. With Analysis of Electromagnetic Fields and Waves, Reinhold Pregla describes an important and powerful method for analyzing electromagnetic waves. This book: Describes the general analysis principles for electromagnetic fields. Includes applications in microwave, millimetre wave and optical frequency regions. Unifies the analysis by introducing generalised transmission line (GTL) equations for all orthogonal coordinate systems and with materials of arbitrary anisotropy as a common start point. Demonstrates a unique analysis principle with the numerical stable impedance/admittance transformation and a physical adapted field transformation concept that is also useful for other modelling algorithms. Includes chapters on Eigenmode calculations for various waveguides, concatenations and junctions of arbitrary number of different waveguide sections in complex devices, periodic structures (e.g. Bragg gratings, meander lines, clystron resonators, photonic crystals), antennas (e.g. circular and conformal). Enables the reader to solve partial differential equations in other physical areas by using the described principles. Features an accompanying website with program codes in Matlab© for special problems. Analysis of Electromagnetic Fields and Waves will appeal to electromagnetic field practitioners in primary and applied research as well as postgraduate students in the areas of photonics, micro- and millimetre waves, general electromagnetics, e.g. microwave integrated circuits, antennas, integrated and fibre optics, optoelectronics, nanophotonics, microstructures, artificial materials.

Physics of Continuous Media Apr 15 2021 Based on the author's many years of lectures and tutorials at Novosibirsk State University and the University of Manchester, Physics of Continuous Media: Problems and Solutions in Electromagnetism, Fluid Mechanics and MHD, Second Edition takes a problems-based approach to teaching continuous media. The book's problems and detailed solutions make it an ideal companion text for advanced physics and engineering courses. Suitable for any core physics program, this revised and expanded edition includes a new chapter on magnetohydrodynamics as well as additional problems and more detailed solutions. Each chapter begins with a summary of the definitions and equations that are necessary to understand and tackle the problems that follow. The text also provides numerous references throughout, including Landau and Lifshitz's famous course of theoretical physics and original journal publications.

Engineering Electromagnetic Fields and Waves Dec 12 2020

Fields, Waves and Transmission Lines Sep 01 2022 One of us (FAB) published a book Problems in Electronics with Solutions in 1957 which became well established and ran to five editions, the last revised and enlarged edition appearing in 1976. When the first edition was written it covered almost the complete undergraduate electronics courses in engin eering at universities. One book, at a price students can afford, can no longer cover an undergraduate course in electronics. It has therefore been decided to produce a book covering one important section of such a course using the experience gained and a few problems from previous editions of Problems in Electronics with Solutions. The book is based largely on problems collected by us over many years and given to undergraduate electronic and electrical engineers. Its purpose is to present the problems, together with a large number of their solutions, in the hope that it will prove valuable to undergraduates and other teachers. It should also be useful for Master's degree students in electronic and electrical engineering and physics, research workers, engineers and scientists in industry and as a reference source.

Electromagnetic Waves Jun 25 2019 Electromagnetism began in the nineteenth century when Faraday showed electricity and magnetism were not distinct, separate phenomena, but interacted when there were time-varying electric or magnetic fields. In Electricity and Magnetism I have shown from first principles how Faraday's experiments led finally to

Maxwell's four equations, which with the electromagnetic-force law summarise the whole of classical electromagnetism. This book therefore begins with Maxwell's equations and then uses them to study the propagation and generation of electromagnetic waves. Physics is a subject in which the more advanced the treatment of a topic, the deeper the understanding of common occurrences that is revealed. In studying the solutions of Maxwell's equations you will find answers to such questions as: What is an electro magnetic wave? Why does a radio wave travel through space at the speed of light? How is a radio wave generated? Why does light pass through a straight tunnel when a radio wave does not? How does light travel down a curved glass fibre? It is a remarkable fact that the classical laws of electromagnetism are fully consistent with Einstein's special theory of relativity and this is discussed in Chapter 2. The following four chapters provide solutions of Maxwell's equations for the propagation of electro magnetic waves in free space, in dielectrics, across interfaces and in conductors respectively.

Acoustic Fields and Waves in Solids May 29 2022

Introduction to Wave Phenomena Oct 10 2020 New York : Wiley, c1985.

Radiation and Scattering of Waves Aug 27 2019 As relevant today as it was when it was first published 20 years ago, this book is a classic in the field. Nowhere else can you find more complete coverage of radiation and scattering of waves. The chapter: Asympotic Evaluation of Integrals is considered the definitive source for asympotic techniques. This book is essential reading for engineers, physicists and others involved in the fields of electromagnetics and acoustics. It is also an indispensable reference for advanced engineering courses.

Plane-Wave Theory of Time-Domain Fields May 05 2020 "This invaluable book provides a comprehensive framework for the formulation and solution ofnumerous problems involving the radiation, reception, propagation, and scattering of electromagnetic and acoustic waves. Filled with original derivations and theorems, it includes the first rigorous development of plane-wave expansions for time-domain electromagnetic and acoustic fields. For the past 35 years, near-field measurement techniques have been confined to the frequency domain. Now, with the publication of this book, probe-corrected near-field measurement techniques have been extended to ultra-wide-band, short-pulse transmitting and receiving antennas and transducers. By combining unencumbered straightforward derivations with in-depth expositions of prerequisite material, the authors have created an invaluable resource for research scientists and engineers in electromagnetics and acoustics, and a definitive reference on plane-wave expansions and near-field measurements. Featured topics include: * An introduction to the basic electromagnetic and acoustic field equations * A rigorous development of time-domain and frequency-domain plane-wave representations * The formulation of time-domain, frequency-domain, and static planar near-field measurement techniques with and without probe-correction * Sampling theorems and computation schemes for time-domain and frequency-domain fields * Analytic-signal formulas that simplify the formulation and analysis of transient fields * Wave phenomena, such as ``electromagnetic missiles"" encountered only in the time domain * Definitive force and power relations for electromagnetic and acoustic fields and sources." Sponsored by: IEEE Antennas and Propagation Society.

Analysis of Electromagnetic Fields and Waves Jul 19 2021 Bragg gratings, meander lines, clystron resonators, photonic crystals), antennas (e.g. circular and conformal); and enables the reader to solve partial differential equations in other physical areas by using the described principles."--BOOK JACKET.

Localized Waves Jan 31 2020 The first book on Localized Waves—a subject of phenomenal worldwide research with important applications from secure communications to medicine Localized waves—also known as non-diffractive waves—are beams and pulses capable of resisting diffraction and dispersion over long distances even in non-guiding media. Predicted to exist in the early 1970s and obtained theoretically and experimentally as solutions to the wave equations starting in 1992, localized waves now garner intense worldwide research with applications in all fields where a role is played by a wave equation, from electromagnetism to acoustics and quantum physics. In the electromagnetics areas, they are paving the way, for instance, to ubiquitous secure communications in the range of millimeter waves, terahertz frequencies, and optics. At last, the localized waves with an envelope at rest are expected to have important applications especially in medicine. Localized Waves brings together the world's most productive researchers in the field to offer a well-balanced presentation of theory and experiments in this new and exciting subject. Composed of thirteen chapters, this dynamic volume: Presents a thorough review of the theoretical foundation and historical aspects of localized waves Explores the interconnections of the subject with other technologies and scientific areas Analyzes the effect of arbitrary anisotropies on both continuous-wave and pulsed non-diffracting fields Describes the physical nature and experimental implementation of localized waves Provides a general overview of wave localization, for example in photonic crystals, which have received increasing attention in recent years Localized Waves is the first book to cover this emerging topic, making it an indispensable resource in particular for researchers in electromagnetics, acoustics, fundamental physics, and free-space communications, while also serving as a requisite text for graduate students.

Introduction to Vibrations and Waves Aug 08 2020 Based on the successful multi-edition book "The Physics of Vibrations and Waves" by John Pain, the authors carry over the simplicity and logic of the approach taken in the original first edition with its focus on the patterns underlying and connecting so many aspects of physical behavior, whilst bringing the subject up-to-date so it is relevant to teaching in the 21st century. The transmission of energy by wave propagation is a key concept that has applications in almost every branch of physics with transmitting mediums essentially acting as a continuum of coupled oscillators. The characterization of these simple oscillators in terms of three parameters related to the storage, exchange, and dissipation of energy forms the basis of this book. The text moves naturally on from a discussion of basic concepts such as damped oscillations, diffraction and interference to more advanced topics such as

transmission lines and attenuation, wave guides, diffusion, Fourier series, and electromagnetic waves in dielectrics and conductors. Throughout the text the emphasis on the underlying principles helps readers to develop their physics insight as an aid to problem solving. This book provides undergraduate students of physics and engineering with the mathematical tools required for full mastery of the concepts. With worked examples presented throughout the text, as well as the Problem sets concluding each chapter, this textbook will enable students to develop their skills and measure their understanding of each topic step-by-step. A companion website is also available, which includes solutions to chapter problems and PowerPoint slides. Review of "The Physics of Vibrations and Waves 6e" This is an excellent textbook, full of interesting material clearly explained and fully worthy of being studied by future contributors ..." Journal of Sound and Vibration

Acoustic fields and waves in solids Sep 20 2021 Volume One begins with a systematic development of basic concepts (strain, stress, stiffness and compliance, viscous clamping) and coordinate transformations in both tensor and matrix notation. The basic elastic field equations are then written in a form analogous to Maxwell's equations. This analogy is then pursued when analyzing wave propagation in both isotropic and anisotropic solids. Piezoelectricity and bulk wave transducers are treated in the final chapter. Appendixes list slowness diagrams and material properties for various crystalline solids.

Mathematical Methods for Oscillators and Waves Jan 01 2020 Anchored in simple physics problems, the author provides a focused introduction to mathematical methods in a structured manner.

Waves in Neural Media Sep 08 2020 Waves in Neural Media: From Single Neurons to Neural Fields surveys mathematical models of traveling waves in the brain, ranging from intracellular waves in single neurons to waves of activity in large-scale brain networks. The work provides a pedagogical account of analytical methods for finding traveling wave solutions of the variety of nonlinear differential equations that arise in such models. These include regular and singular perturbation methods, weakly nonlinear analysis, Evans functions and wave stability, homogenization theory and averaging, and stochastic processes. Also covered in the text are exact methods of solution where applicable. Historically speaking, the propagation of action potentials has inspired new mathematics, particularly with regard to the PDE theory of waves in excitable media. More recently, continuum neural field models of large-scale brain networks have generated a new set of interesting mathematical questions with regard to the solution of nonlocal integro-differential equations. Advanced graduates, postdoctoral researchers and faculty working in mathematical biology, theoretical neuroscience, or applied nonlinear dynamics will find this book to be a valuable resource. The main prerequisites are an introductory graduate course on ordinary differential equations or partial differential equations, making this an accessible and unique contribution to the field of mathematical biology.

Colliding Plane Waves in General Relativity Apr 27 2022 This monograph is a survey of recent research on the collision and interaction of gravitational and electromagnetic waves, a topic of particular importance to general relativity. 1991 edition, with updated postscript.

Electromagnetism and the Structure of Matter Jul 07 2020 The classical theory of electromagnetism is entirely revised in this book by proposing a variant of Maxwell equations that allows solitonic solutions (photons). The Lagrangian is the standard one, but it is minimized on a constrained space that enforces the wave packets to follow the rules of geometrical optics. Exact solutions are explicitly shown; this opens a completely new perspective for the study of light wave phenomena. In the framework of general relativity, the equations are written in covariant form. A coupling with the metric is obtained through the Einstein equation, whose solutions are computed exactly in a lot of original situations. Finally, the explicit construction of elementary particles, consisting of rotating photons, is indicated. The results agree qualitatively and quantitatively with what it is actually observed. This opens the path to an understanding of the structure of matter and its properties, also aimed to provide a causal explanation to quantum phenomena.

Physics-Doklady Apr 03 2020

Radio Science Feb 11 2021

Electromagnetic Fields and Waves Nov 03 2022 This textbook is intended for a course in electromagnetism for upper undergraduate and graduate students. The main concepts and laws of classical macroscopic electrodynamics and initial information about generalized laws of modern electromagnetics are discussed, explaining some paradoxes of the modern theory. The reader then gets acquainted with electrodynamics methods of field analysis on the basis of wave equation solution. Emission physics are considered using an example of the Huygens-Fresnel-Kirchhoff canonic principle. The representation about strict electrodynamics task statement on the base of Maxwell equations, boundary conditions, emission conditions and the condition on the edge is given. Different classes of approximate boundary conditions are presented, which essentially simplify understanding of process physics. The canonic Fresnel functions are given and their generalization on the case of anisotropic impedance. The free waves in closed waveguides and in strip-slotted and edge-dielectric transmission lines are described. A large number of Mathcad programs for illustration of field patterns and its properties in different guiding structures are provided. The material is organized for self-study as well as classroom use.

Solutions to Problems of Controlling Long Waves with the Help of Micro-structure Tools Dec 24 2021 "In recent times the idea of cloaking has become very popular. After radar and sonar were discovered, problems of ""visibility"" reduction for physical bodies in air (by electromagnetic waves) or in water (by acoustical waves) have immediately become serious"