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In the recent decades, there has been a growing interest in micro- and nanotechnology. The advances in nanotechnology give rise to new applications and new types of materials with unique electromagnetic and mechanical properties. This book is devoted to the modern methods in electrodynamics and acoustics, which have been developed to describe wave propagation in these modern materials and nanodevices. The book consists of original works of leading scientists in the field of wave propagation who produced new theoretical and experimental methods in the research field and obtained new and important results. The first part of the book consists of chapters with general mathematical methods and approaches to the problem of wave propagation. A special attention is attracted to the advanced numerical methods fruitfully applied in the field of wave propagation. The second part of the book is devoted to the problems of wave propagation in newly developed metamaterials, micro- and nanostructures and porous media. In this part the interested reader will find important and fundamental results on electromagnetic wave propagation in media with negative refraction index and electromagnetic imaging in devices based on the materials. The third part of the book is devoted to the problems of wave propagation in elastic and piezoelectric media. In the fourth part, the works on the problems of wave propagation in plasma are collected. The fifth, sixth and seventh parts are devoted to the problems of wave propagation in media with chemical reactions, in nonlinear and disperse media, respectively. And finally, in the eighth part of the book some experimental methods in wave propagations are considered. It is necessary to emphasize that this book is not a textbook. It is important that the results combined in it are taken "from the desks of researchers". Therefore, I am sure that in this book the interested and actively working readers (scientists, engineers and students) will find many interesting results and new ideas. This paper presents a spectral analysis of the acoustic fields in stationary plane stratified fluids whose densities and sound speeds are functions of the depth. The analysis is based on families of normal mode fields that have simple physical interpretations. The acoustic field in such a fluid may be described by an acoustic potential or by the excess pressure. Excerpt from Propagation of Electromagnetic Waves From an Arbitrary Source Through Inhomogeneous Stratified Atmospheres This argument is applied first to the case where a source is located be low a semi-infinite non-homogeneous medium and the field in the medium is then determined. The more general case of an arbitrary source located between two semi infinite media is treated next. This section can be Specialized to treat the case of a source of radiation located above the earth. The main result of the paper is embodied in formulas and which give the expressions for V and.w. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works. Transient acoustic wave propagation is analyzed for the case of plane-stratified fluids having density rho(y) and sound speed c(y) at depth y. For infinite fluids it is assumed that the (in general discontinuous) functions rho(y), c(y) are uniformly positive and bounded and satisfy abs.val (rho(y) - rho(at infinity)) or = C(+ or - y) to the - alpha power, abs. val. (c(y) - c(at infinity)) or = C(+ or - y) to the - alpha power for + or - y 0, where alpha 3/2. Semi-infinite and finite layers are also treated. The acoustic potential is a solution of the wave equation del-squared u/del t-squared - c-squared(y) rho(y) del dot (1/rho(y)grad(u)) = f(t, x, y) where x = (x1,x2) are horizontal coordinates and f(t, x, y) characterizes the wave sources. The principal results of the analysis show that u is the sum of a free component, which behaves like a diverging spherical wave for large t, and a guided component which is approximately localized in regions abs. val. (y - y sub j) This work has been selected by scholars as being culturally important, and is part of the knowledge base of civilization as we know it. This work is in the "public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. We appreciate your support of the preservation process, and thank you for being an important part of keeping this knowledge alive and relevant. An iterative technique for calculating the propagation coefficient for electromagnetic waves traveling along a stratified medium. The strata are required only to be 'parallel' and to have scalar electrical parameters; no restrictions are placed on the distribution of these parameters. The boundary conditions at the top and bottom strata may be of a variety of forms; for example, a surface impedance may be specified or outgoing waves only may be required. The technique is explicitly presented for rectangular, cylindrical, and spherical geometries. In cylindrical geometry, the 'parallel' strata are concentric cylinders, and in spherical geometry, they are concentric spheres. The technique is designed to be used on a digital computer. It has been programmed and used to solve several practical problems. (Author). Seismic waves are one of the standard diagnostic tools used to determine the mechanical parameters (volume density of mass, compressibility, elastic stiffness) in the interior of the earth and the geometry of subsurface structures. There is increasing evidence that in the interpretation of seismic data - especially shear-wave data - the influence of anisotropy must be taken into account. This volume presents a method to compute the seismic waves that are generated by an impulsive source in a stratified anisotropic medium. Although written with the seismic applications in mind, the method that is developed is not limited to solid-earth geophysics. In fact, the methods discussed in this monograph are applicable wherever waves propagate in stratified, anisotropic media. The standard approach to this problem is to employ Fourier transformations with respect to time and with respect to the horizontal spatial coordinates. To obtain numerical results, the relevant inverse transformations then have to be evaluated numerically. In this monograph the problem is, in contrast to the standard approach, solved by applying the Cagniard-de Hoop method and by representing the wave field as a sum of generalized rays. With this method, the computational results can be obtained relatively easily with any degree of accuracy, and with considerably less computation time. For completeness, analysis of acoustic waves in stratified isotropic media is included. Furthermore, for large horizontal or vertical source-receiver separations very efficient approximations are derived. Several examples and applications are given. Stratified fluids whose densities, sound speeds and other parameters are functions of a single depth coordinate occur widely in nature. Indeed, the earth's gravitational field imposes a stratification on its atmosphere, oceans and lakes. It is well known that their stratification has a profound effect on the propagation of sound in these fluids. The most striking effect is probably the occurrence of acoustic ducts, due to minima of the sound speed, that can trap sound waves and cause them to propagate hori zontally. The reflection, transmission and distortion of sonar signals by acoustic ducts is important in interpreting sonar echoes. Signal scattering by layers of microscopic marine organisms is important to both sonar engi neers and marine biologists. Again, reflection of signals from bottom sediment layers overlying a penetrable bottom are of interest both as sources of unwanted echoes and in the acoustic probing of such layers. Many other examples could be given. The purpose of this monograph is to develop from first principles a theory of sound propagation in stratified fluids whose densities and sound speeds are essentially arbitrary functions of the depth. In physical terms, the propagation of both time-harmonic and transient fields is analyzed. The corresponding mathematical model leads to the study of boundary value problems for a scalar wave equation whose coefficients contain the pre scribed density and sound speed functions. Seismic Wave Propagation in Stratified Media presents a systematic treatment of the interaction of seismic waves with Earth structure. The theoretical development is physically based and is closely tied to the nature of the seismograms observed across a wide range of distance scales - from a few kilometres as in shallow reflection work for geophysical prospecting, to many thousands of kilometres for major earthquakes. A unified framework is presented for all classes of seismic phenomena, for both body waves and surface waves. Since its first publication in 1983 this book has been an important resource for understanding the way in which seismic waves can be understood in terms of reflection and transmission properties of Earth models, and how complete theoretical seismograms can be calculated. The methods allow the development of specific approximations that allow concentration on different seismic arrivals and hence provide a direct tie to seismic observations. 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. THE SOLUTION FOR PLANE HARMONIC WAVES PROPAGATING IN A STRATIFIED REGION, WHERE EACH LAYER IS HOMOGENEOUS, ELASTIC, AND FULLY ANISOTROPIC (21 CONSTANTS OF ELASTICITY) IS PRESENTED. THE TREATMENT OF VARIOUS BOUNDARY AND OR RADIATION CONDITIONS AT THE TOP AND BOTTOM OF THE LAYERED REGION IS DISCUSSED. The success of this book stems from its clear and concise, yet detailed summary of the advances in seismic source studies during the past two decades. Dr Kennett presents a mainly theoretical account of the passage of seismic waves from source to receiver, linking the theoretical development to the nature of seismograms observed across a wide range of distance scales - from a few kilometres, as in shallow reflection work for geophysical prospecting, to many thousands of kilometres for earthquakes. A unified framework is presented for all classes of seismic phenomena, for both body waves and surface waves. Each topic is taken up systematically, including many topics not normally covered in discussion of propagator theory, such as source representation theory, generalised ray theory, and the calculation of complete theoretical seismograms including all wave effects arising from the presence of the Earth's surface. The circle diagram technique from transmission line theory is applied and extended to enable the graphical solution of types of transmission line problems that occur in the analysis of propagation in stratified fluids. The normalized impedance satisfies a generalized Riccati equation, but the analysis is approximated by a graphical solution for a line with a step-wise varying wave number. Another modification has been made for cases of imaginary wave number, i. e. an overdense medium. For infinite domains, a graphical solution has been matched to an asymptotic approximation. Techniques are developed for obtaining approximations of transmission through and reflections from stratified layers, eigenfunctions and eigenvalues, and Green's functions. (Author). The propagation of acoustic and electromagnetic waves in stratified media is a subject that has profound implications in many areas of applied physics and in engineering, just to mention a few, in ocean acoustics, integrated optics, and wave guides. See for example Tolstoy and Clay 1966, Marcuse 1974, and Brekhovskikh 1980. As is well known, stratified media, that is to say media whose physical properties depend on a single coordinate, can produce guided waves that propagate in directions orthogonal to that of stratification, in addition to the free waves that propagate as in homogeneous media. When the stratified media are perturbed, that is to say when locally the physical properties of the media depend upon all of the coordinates, the free and guided waves are no longer solutions to the appropriate wave equations, and this leads to a rich pattern of wave propagation that involves the scattering of the free and guided waves among each other, and with the perturbation. These phenomena have many implications in applied physics and engineering, such as in the transmission and reflexion of guided waves by the perturbation, interference between guided waves, and energy losses in open wave guides due to radiation. The subject matter of this monograph is the study of these phenomena. The dispersion properties and the fields of electromagnetic waves are investigated for propagation in a stratified infinite medium. The stratification is characterized by a dielectric constant which, along one coordinate, is modulated sinusoidally about an average value. A systematic and comprehensive study is presented for the case of H modes for which the pertinent wave equation is in the form of a Mathieu differential equation. The modes and dispersion characteristics are analyzed in terms of a stability chart which is customary in the study of the Mathieu equation. Results are obtained for an unbounded medium, and a waveguide filled with the modulated medium; also, the reflection occurring at an interface between free space and a semi-infinite medium of this type is examined. In addition to these rigorous results for arbitrary values of modulation, simple analytical expressions are obtained for all of these cases when the modulation in the dielectric is small; it is shown that the fields are then expressible in terms of the fundamental and the two nearest space harmonics. The fields within a unit cell in the stratified medium are calculated for both small and large modulation and for frequencies up through the second pass band; it is of interest that the variation of the fields is not, in general, simply related to the variation of the dielectric constant within a cell. (Author).

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