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Numerical Methods for Wave Equations in Geophysical Fluid Dynamics-Dale R. Durran 2013-03-14 Covering a wide range of techniques, this book describes methods for the solution of partial differential equations which govern wave propagation and are used in modeling atmospheric and oceanic flows. The presentation establishes a concrete link between theory and practice.
Higher-Order Numerical Methods for Transient Wave Equations-Gary Cohen 2013-04-17 "To my knowledge [this] is the first book to address specifically the use of high-order discretizations in the time domain to solve wave equations. [...] I recommend the book for its clear and cogent coverage of the material selected by its author." --Physics Today, March 2003
Fortran Program for the Numerical Solution of the Schrödinger Wave Equation-George Wilcox 1965
Seismic Inversion-Gerard T. Schuster 2017-07-01 This book describes the theory and practice of inverting seismic data for the subsurface rock properties of the earth. The primary application is for inverting reflection and/or transmission data from engineering or exploration surveys, but the methods described also can be used for earthquake studies. Seismic Inversion will be of benefit to scientists and advanced students in engineering, earth sciences, and physics. It is desirable that the reader has some familiarity with certain aspects of numerical computation, such as finite-difference solutions to partial differential equations, numerical linear algebra, and the basic physics of wave propagation. For those not familiar with the terminology and methods of seismic exploration, a brief introduction is provided. To truly understand the nuances of seismic inversion, we have to actively practice what we preach (or teach). Therefore, computational labs are provided for most of the chapters, and some field data labs are given as well.
Finite Difference Computing with PDEs-Hans Petter Langtangen 2017-06-21 This book is open access under a CC BY 4.0 license. This easy-to-read book introduces the basics of solving partial differential equations by means of finite difference methods. Unlike many of the traditional academic works on the topic, this book was written for practitioners. Accordingly, it especially addresses: the construction of finite difference schemes, formulation and implementation of algorithms, verification of implementations, analyses of physical behavior as implied by the numerical solutions, and how to apply the methods and software to solve problems in the fields of physics and biology.
Traveling Wave Analysis of Partial Differential Equations-Graham Griffiths 2010-12-09 Although the Partial Differential Equations (PDE) models that are now studied are usually beyond traditional mathematical analysis, the numerical methods that are being developed and used require testing and validation. This is often done with PDEs that have known, exact, analytical solutions. The development of analytical solutions is also an active area of research, with many advances being reported recently, particularly traveling wave solutions for nonlinear evolutionary PDEs. Thus, the current development of analytical solutions directly supports the development of numerical methods by providing a spectrum of test problems that can be used to evaluate numerical methods. This book surveys some of these new developments in analytical and numerical methods, and relates the two through a series of PDE examples. The PDEs that have been selected are largely "named'' since they carry the names of their original contributors. These names usually signify that the PDEs are widely recognized and used in many application areas. The authors’ intention is to provide a set of numerical and analytical methods based on the concept of a traveling wave, with a central feature of conversion of the PDEs to ODEs. The Matlab and Maple software will be available for download from this website shortly. www.pdecomp.net Includes a spectrum of applications in science, engineering, applied mathematics Presents a combination of numerical and analytical methods Provides transportable computer codes in Matlab and Maple
Analytical and Numerical Methods for Wave Propagation in Fluid Media-K Murawski 2002-11-06 This book surveys analytical and numerical techniques appropriate to the description of fluid motion with an emphasis on the most widely used techniques exhibiting the best performance. Analytical and numerical solutions to hyperbolic systems of wave equations are the primary focus of the book. In addition, many interesting wave phenomena in fluids are considered using examples such as acoustic waves, the emission of air pollutants, magnetohydrodynamic waves in the solar corona, solar wind interaction with the planet venus, and ion-acoustic solitons. Contents:Mathematical Description of FluidsLinear WavesModel Equations for Weakly Nonlinear WavesAnalytical Methods for Solving the Classical Model Wave EquationsNumerical Methods for a Scalar Hyperbolic EquationsReview of Numerical Methods for Model Wave EquationsNumerical Schemes for a System of One-Dimensional Hyperbolic EquationsA Hyperbolic System of Two-Dimensional EquationsNumerical Methods for the MHD EquationsNumerical Experiments Readership: Researchers in applied and pure mathematics as well as computational and mathematical physics. Keywords:Reviews:“This book tries to fill the gap in the literature by considering together analytical and numerical approaches. The main attention is paid to the wave solutions of the quasi-hyperbolic systems appearing in fluids, plasma, and astrophysics, taking into account the nonlinearity, dispersion, dissipation and randomness of media ... It can be useful for students studying the modeling of the wave processes in fluids, plasma and astrophysics.”Professor Efim Pelinovsky Russian Academy of Sciences “The book will be of interest to readers intending to enter this field, and it contains an extensive bibliography that will be useful for readers wishing to widen their study of these topics.”Mathematics Abstracts “I found the book to be very thorough in its description of methods, and the difficulties faced in solving hyperbolic problems ... overall I was impressed with this book, and I recommend it as an excellent review source.”Mathematical Reviews
Fourier Series and Numerical Methods for Partial Differential Equations-Richard Bernatz 2010-07-30 The importance of partial differential equations (PDEs) in modeling phenomena in engineering as well as in the physical, natural, and social sciences is well known by students and practitioners in these fields. Striking a balance between theory and applications, Fourier Series and Numerical Methods for Partial Differential Equations presents an introduction to the analytical and numerical methods that are essential for working with partial differential equations. Combining methodologies from calculus, introductory linear algebra, and ordinary differential equations (ODEs), the book strengthens and extends readers' knowledge of the power of linear spaces and linear transformations for purposes of understanding and solving a wide range of PDEs. The book begins with an introduction to the general terminology and topics related to PDEs, including the notion of initial and boundary value problems and also various solution techniques. Subsequent chapters explore: The solution process for Sturm-Liouville boundary value ODE problems and a Fourier series representation of the solution of initial boundary value problems in PDEs The concept of completeness, which introduces readers to Hilbert spaces The application of Laplace transforms and Duhamel's theorem to solve time-dependent boundary conditions The finite element method, using finite dimensional subspaces The finite analytic method with applications of the Fourier series methodology to linear version of non-linear PDEs Throughout the book, the author incorporates his own class-tested material, ensuring an accessible and easy-to-follow presentation that helps readers connect presented objectives with relevant applications to their own work. Maple is used throughout to solve many exercises, and a related Web site features Maple worksheets for readers to use when working with the book's one- and multi-dimensional problems. Fourier Series and Numerical Methods for Partial Differential Equations is an ideal book for courses on applied mathematics and partial differential equations at the upper-undergraduate and graduate levels. It is also a reliable resource for researchers and practitioners in the fields of mathematics, science, and engineering who work with mathematical modeling of physical phenomena, including diffusion and wave aspects.
Computational Partial Differential Equations-Hans Petter Langtangen 2013-04-17 Targeted at students and researchers in computational sciences who need to develop computer codes for solving PDEs, the exposition here is focused on numerics and software related to mathematical models in solid and fluid mechanics. The book teaches finite element methods, and basic finite difference methods from a computational point of view, with the main emphasis on developing flexible computer programs, using the numerical library Diffpack. Diffpack is explained in detail for problems including model equations in applied mathematics, heat transfer, elasticity, and viscous fluid flow. All the program

examples, as well as Diffpack for use with this book, are available on the Internet. XXXXXXX NEUER TEXT This book is for researchers who need to develop computer code for solving PDEs. Numerical methods and the application of Diffpack are explained in detail. Diffpack is a modern C++ development environment that is widely used by industrial scientists and engineers working in areas such as oil exploration, groundwater modeling, and materials testing. All the program examples, as well as a test version of Diffpack, are available for free over the Internet.
Numerical Analysis of Partial Differential Equations Using Maple and MATLAB-Martin J. Gander 2018-08 This book provides an elementary yet comprehensive introduction to the numerical solution of partial differential equations (PDEs). Used to model important phenomena, such as the heating of apartments and the behavior of electromagnetic waves, these equations have applications in engineering and the life sciences, and most can only be solved approximately using computers. Numerical Analysis of Partial Differential Equations Using Maple and MATLAB provides detailed descriptions of the four major classes of discretization methods for PDEs (finite difference method, finite volume method, spectral method, and finite element method) and runnable MATLAB® code for each of the discretization methods and exercises. It also gives self-contained convergence proofs for each method using the tools and techniques required for the general convergence analysis but adapted to the simplest setting to keep the presentation clear and complete. This book is intended for advanced undergraduate and early graduate students in numerical analysis and scientific computing and researchers in related fields. It is appropriate for a course on numerical methods for partial differential equations.
Partial Differential Equations with Numerical Methods-Stig Larsson 2003 This softcover reprint of a very popular book presents a very well written and systematic introduction to the finite difference and finite element methods for the numerical solution of the basic types of linear partial differential equations (PDE).
Numerical Modeling of Seismic Wave Propagation-Johan O. A. Robertsson 2012
Dual Reciprocity Boundary Element Method-P.W. Partridge 2012-12-06 The boundary element method (BEM) is now a well-established numerical technique which provides an efficient alternative to the prevailing finite difference and finite element methods for the solution of a wide range of engineering problems. The main advantage of the BEM is its unique ability to provide a complete problem solution in terms of boundary values only, with substantial savings in computer time and data preparation effort. An initial restriction of the BEM was that the fundamental solution to the original partial differential equation was required in order to obtain an equivalent boundary in tegral equation. Another was that non-homogeneous terms accounting for effects such as distributed loads were included in the formulation by means of domain integrals, thus making the technique lose the attraction of its "boundary-only" character. Many different approaches have been developed to overcome these problems. It is our opinion that the most successful so far is the dual reciprocity method (DRM), which is the subject matter of this book. The basic idea behind this approach is to employ a fundamental solution corresponding to a simpler equation and to treat the remaining terms, as well as other non-homogeneous terms in the original equation, through a procedure which involves a series expansion using global approximating functions and the application of reciprocity principles.
Kinematic Wave Modeling in Water Resources-Vijay P. Singh 1996-03-29 Kinematic wave modeling methods are gaining wide acceptance as a fast and accurate way of handling a wide range of water modeling problems. This is the first book to provide a thorough reference to the application of KW methods to such problems as the spatial representation of watersheds, overland flow routing, and channel flow routing.
Partial Differential Equations-J. Necas 2018-05-04 As a satellite conference of the 1998 International Mathematical Congress and part of the celebration of the 650th anniversary of Charles University, the Partial Differential Equations Theory and Numerical Solution conference was held in Prague in August, 1998. With its rich scientific program, the conference provided an opportunity for almost 200 participants to gather and discuss emerging directions and recent developments in partial differential equations (PDEs). This volume comprises the Proceedings of that conference. In it, leading specialists in partial differential equations, calculus of variations, and numerical analysis present up-to-date results, applications, and advances in numerical methods in their fields. Conference organizers chose the contributors to bring together the scientists best able to present a complex view of problems, starting from the modeling, passing through the mathematical treatment, and ending with numerical realization. The applications discussed include fluid dynamics, semiconductor technology, image analysis, motion analysis, and optimal control. The importance and quantity of research carried out around the world in this field makes it imperative for researchers, applied mathematicians, physicists and engineers to keep up with the latest developments. With its panel of international contributors and survey of the recent ramifications of theory, applications, and numerical methods, Partial Differential Equations: Theory and Numerical Solution provides a convenient means to that end.
Numerical Solution of Partial Differential Equations in Science and Engineering-Leon Lapidus 1982 "This book was written to provide a text for graduate and undergraduate students who took our courses in numerical methods. It incorporates the essential elements of all the numerical methods currently used extensively in the solution of partial differential equations encountered regularly in science and engineering. Because our courses were typically populated by students from varied backgrounds and with diverse interests, we attempted to eliminate jargon or nomenclature that would render the work unintelligible to any student. Moreover, in response to student needs, we incorporated not only classical (and not so classical) finite-difference methods but also finite-element, collocation, and boundary-element procedures. After an introduction to the various numerical schemes, each equation type--parabolic, elliptic, and hyperbolic--is allocated a separate chapter. Within each of these chapters the material is presented by numerical method. Thus one can read the book either by equation-type or numerical approach."--Preface, page [v].
Analytic Methods for Partial Differential Equations-G. Evans 2012-12-06 This is the practical introduction to the analytical approach taken in Volume 2. Based upon courses in partial differential equations over the last two decades, the text covers the classic canonical equations, with the method of separation of variables introduced at an early stage. The characteristic method for first order equations acts as an introduction to the classification of second order quasi-linear problems by characteristics. Attention then moves to different co-ordinate systems, primarily those with cylindrical or spherical symmetry. Hence a discussion of special functions arises quite naturally, and in each case the major properties are derived. The next section deals with the use of integral transforms and extensive methods for inverting them, and concludes with links to the use of Fourier series.
Computational Seismology-Heiner Igel 2016-11-03 This book is an introductory text to a range of numerical methods used today to simulate time-dependent processes in Earth science, physics, engineering, and many other fields. The physical problem of elastic wave propagation in 1D serves as a model system with which the various numerical methods are introduced and compared. The theoretical background is presented with substantial graphical material supporting the concepts. The results can be reproduced with the supplementary electronic material provided as python codes embedded in Jupyter notebooks. The book starts with a primer on the physics of elastic wave propagation, and a chapter on the fundamentals of parallel programming, computational grids, mesh generation, and hardware models. The core of the book is the presentation of numerical solutions of the wave equation with six different methods: 1) the finite-difference method; 2) the pseudospectral method (Fourier and Chebyshev); 3) the linear finite-element method; 4) the spectral-element method; 5) the finite-volume method; and 6) the discontinuous Galerkin method. Each chapter contains comprehension questions, theoretical, and programming exercises. The book closes with a discussion of domains of application and criteria for the choice of a specific numerical method, and the presentation of current challenges. Readers are welcome to visit the author's website www.geophysik.lmu.de/Members/igel for more information on his research, projects, publications, and other activities.
Parabolic Wave Equations with Applications-Michael D. Collins 2019-11-04 This book introduces parabolic wave equations, their key methods of numerical solution, and applications in seismology and ocean acoustics. The parabolic equation method provides an appealing combination of accuracy and efficiency for many nonseparable wave propagation problems in geophysics. While the parabolic equation method was pioneered in the 1940s by Leontovich and Fock who applied it to radio wave propagation in the atmosphere, it thrived in the 1970s due to its usefulness in seismology and ocean acoustics. The book covers progress made following the parabolic equation’s ascendancy in geophysics. It begins with the necessary preliminaries on the elliptic wave equation and its analysis from which the parabolic wave equation is derived and introduced. Subsequently, the authors demonstrate the use of rational approximation techniques, the Padé solution in particular, to find numerical solutions to the energy-conserving parabolic equation, three-dimensional parabolic equations, and horizontal wave equations. The rest of the book demonstrates applications to seismology, ocean acoustics, and beyond, with coverage of elastic waves, sloping interfaces and boundaries, acousto-gravity waves, and waves in poro-elastic media. Overall, it will be of use to students and researchers in wave propagation, ocean acoustics, geophysical sciences and more.
Partial Differential Equations-Mark S. Gockenbach 2010 Partial differential equations (PDEs) are essential for modeling many physical phenomena. This undergraduate textbook introduces students to the topic with a unique approach that emphasizes the modern finite element method alongside the classical method of Fourier analysis.
Advances in Coastal and Ocean Engineering-Philip L. F. Liu 2000 This invaluable volume consists of five articles covering a wide range of topics in coastal engineering. The reader can find a paper discussing the modern optical measurement techniques applied to wave studies. An introductory paper on wavelet theory provides readers with a new perspective on coastal and ocean engineering data analysis. For those who are interested in wave modeling, a review article on the stochastic evolution models is included. A detailed review paper on the recent sediment transport research should supply enough motivation for more research in this area. Finally, readers who are interested in

history can find an interesting article reviewing the coastal development and coastal engineering activities in Japanese history.
Finite Element and Discontinuous Galerkin Methods for Transient Wave Equations-Gary Cohen 2016-08-05 This monograph presents numerical methods for solving transient wave equations (i.e. in time domain). More precisely, it provides an overview of continuous and discontinuous finite element methods for these equations, including their implementation in physical models, an extensive description of 2D and 3D elements with different shapes, such as prisms or pyramids, an analysis of the accuracy of the methods and the study of the Maxwell's system and the important problem of its spurious free approximations. After recalling the classical models, i.e. acoustics, linear elastodynamics and electromagnetism and their variational formulations, the authors present a wide variety of finite elements of different shapes useful for the numerical resolution of wave equations. Then, they focus on the construction of efficient continuous and discontinuous Galerkin methods and study their accuracy by plane wave techniques and a priori error estimates. A chapter is devoted to the Maxwell's system and the important problem of its spurious-free approximations. Treatment of unbounded domains by Absorbing Boundary Conditions (ABC) and Perfectly Matched Layers (PML) is described and analyzed in a separate chapter. The two last chapters deal with time approximation including local time-stepping and with the study of some complex models, i.e. acoustics in flow, gravity waves and vibrating thin plates. Throughout, emphasis is put on the accuracy and computational efficiency of the methods, with attention brought to their practical aspects.This monograph also covers in details the theoretical foundations and numerical analysis of these methods. As a result, this monograph will be of interest to practitioners, researchers, engineers and graduate students involved in the numerical simulationof waves.
Fifth International Conference on Mathematical and Numerical Aspects of Wave Propagation-Alfredo Berm?dez 2000-01-01 This conference was held in Santiago de Compostela, Spain, July 10-14, 2000. This volume contains papers presented at the conference covering a broad range of topics in theoretical and applied wave propagation in the general areas of acoustics, electromagnetism, and elasticity. Both direct and inverse problems are well represented. This volume, along with the three previous ones, presents a state-of-the-art primer for research in wave propagation. The conference is conducted by the Institut National de Recherche en Informatique et en Automatique with the cooperation of SIAM.
Spectral Methods in MATLAB-Lloyd N. Trefethen 2000-07-01 Mathematics of Computing -- Numerical Analysis.
Finite Difference Schemes and Partial Differential Equations-John C. Strikwerda 2007-09-20 A unified and accessible introduction to the basic theory of finite difference schemes.
Numerical Solution of Differential Equations-Zhilin Li 2017-11-30 A practical and concise guide to finite difference and finite element methods. Well-tested MATLAB® codes are available online.
Numerical Solution of Time-Dependent Advection-Diffusion-Reaction Equations-Willem Hundsdorfer 2013-04-17 Unique book on Reaction-Advection-Diffusion problems
Ocean Acoustic Propagation by Finite Difference Methods-D. Lee 2014-06-28 A concise guide to the theory and application of numerical methods for predicting ocean acoustic propagation, also providing an introduction to numerical methods, with an overview of those methods presently in use. An in-depth development of the implicit-finite-difference technique is presented together with bench-mark test examples included to demonstrate its application to realistic ocean environments. Other applications include atmospheric acoustics, plasma physics, quantum mechanics, optics and seismology.
Numerical Methods for Partial Differential Equations-G. Evans 2012-12-06 The subject of partial differential equations holds an exciting and special position in mathematics. Partial differential equations were not consciously created as a subject but emerged in the 18th century as ordinary differential equations failed to describe the physical principles being studied. The subject was originally developed by the major names of mathematics, in particular, Leonard Euler and Joseph-Louis Lagrange who studied waves on strings; Daniel Bernoulli and Euler who considered potential theory, with later developments by Adrien-Marie Legendre and Pierre-Simon Laplace; and Joseph Fourier's famous work on series expansions for the heat equation. Many of the greatest advances in modern science have been based on discovering the underlying partial differential equation for the process in question. James Clerk Maxwell, for example, put electricity and magnetism into a unified theory by establishing Maxwell's equations for electromagnetic theory, which gave solutions for prob lems in radio wave propagation, the diffraction of light and X-ray developments. Schrodinger's equation for quantum mechanical processes at the atomic level leads to experimentally verifiable results which have changed the face of atomic physics and chemistry in the 20th century. In fluid mechanics, the Navier Stokes' equations form a basis for huge number-crunching activities associated with such widely disparate topics as weather forecasting and the design of supersonic aircraft. Inevitably the study of partial differential equations is a large undertaking, and falls into several areas of mathematics.
A Compendium of Partial Differential Equation Models-William E. Schiesser 2009-03-16 Presents numerical methods and computer code in Matlab for the solution of ODEs and PDEs with detailed line-by-line discussion.
Wave Propagation and Inversion-William Edward Fitzgibbon 1992-01-01 One of three volumes on topics that arose from a September 1989 conference in Houston on mathematical and computational issues in geophysical fluid and solid mechanics. The nine papers include discussions of waves in partially saturated porous media, wave propagation by step marching, and optimal fi
Discrete Numerical Methods in Physics and Engineering-Greenspan 1974-05-31 Discrete Numerical Methods in Physics and Engineering
Harmonization of Seismic Hazard in Vrancea Zone-Anton Zaicenco 2008-11-14 The NATO Science for Peace Project SfP-980468 Harmonization of Seismic Hazard and Risk Reduction in Countries Influenced by Vrancea Earthquakes was an ambitious attempt to harmonize the seismic-hazard assessment in Bulgaria, Moldova and Romania, and provide the guidelines for seismic risk reduction in the target countries. Related to the study of intermediate-depth Vrancea earthquakes, it became operational in 2005. The project co-coordinators were as follows: • Prof. Güney Özcebe, Ankara, Turkey; • Dr. Anton Zaicenco, Chisinau, Moldova; • Dr. Iolanda Craifaleanu, Bucharest, Romania; • Prof. Ivanka Paskaleva, Sofia, Bulgaria. The project has brought together leading research personalities in the area of earthquake engineering, seismology and earth physics from several countries for brainstorming sessions, informal discussions, and exchanges of ideas. One of its key components was an upgrade of the strong-motion seismic networks of the countries-participants, which created a foundation for a long-term collaboration. A number of papers have been published as a result of the work conducted under this project. The present book contains the Proceedings of the Closing Workshop for Project SfP-980468, which was organized in Chisinau, Moldova on May 20, 2008. From hazard analyses to protection of the historical buildings, from study of the dynamic properties of the soft soils to paleoseismology, there are few areas of interest that remain untouched. Research from the NATO members and partner countries in South-Eastern Europe that forms the components of NATO Project SfP-980468 has made solid contributions to the Workshop theme.
Numerical Methods for Evolutionary Differential Equations-Uri M. Ascher 2008-09-04 Develops, analyses, and applies numerical methods for evolutionary, or time-dependent, differential problems.
Numerical Solution of Differential Equations-Mahinder Kumar Jain 1984
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.
Partial Differential Equations and Solitary Waves Theory-Abdul-Majid Wazwaz 2010-05-28 "Partial Differential Equations and Solitary Waves Theory" is a self-contained book divided into two parts: Part I is a coherent survey bringing together newly developed methods for solving PDEs. While some traditional techniques are presented, this part does not require thorough understanding of abstract theories or compact concepts. Well-selected worked examples and exercises shall guide the reader through the text. Part II provides an extensive exposition of the solitary waves theory. This part handles nonlinear evolution equations by methods such as Hirota's bilinear method or the tanh-coth method. A self-contained treatment is presented to discuss complete integrability of a wide class of nonlinear equations. This part presents in an accessible manner a systematic presentation of solitons, multi-soliton solutions, kinks, peakons, cuspons, and compactons. While the whole book can be used as a text for advanced undergraduate and graduate students in applied mathematics, physics and engineering, Part II will be most useful for graduate students and researchers in mathematics, engineering, and other related fields. Dr. Abdul-Majid Wazwaz is a Professor of Mathematics at Saint Xavier University, Chicago, Illinois, USA.
Numerical Methods for Hyperbolic Equations-Elena Vázquez-Cendón 2012-11-05 Numerical Methods for Hyperbolic Equations is a collection of 49 articles presented at the International Conference on Numerical Methods for Hyperbolic Equations: Theory and Applications (Santiago de Compostela, Spain, 4-8 July 2011). The conference was organized to honour Professor Eleuterio Toro in the month of his 65th birthday. The topics cover
Full Seismic Waveform Modelling and Inversion-Andreas Fichtner 2010-11-16 Recent progress in numerical methods and computer science allows us today to simulate the propagation of seismic waves through realistically

heterogeneous Earth models with unprecedented accuracy. Full waveform tomography is a tomographic technique that takes advantage of numerical solutions of the elastic wave equation. The accuracy of the numerical solutions and the exploitation of complete waveform information result in tomographic images that are both more realistic and better resolved. This book develops and describes state of the art methodologies covering all aspects of full waveform tomography including methods for the numerical solution of the elastic wave equation, the adjoint method, the design of objective functionals and optimisation schemes. It provides a variety of case studies on all scales from local to global based on a large number of examples involving real data. It is a comprehensive reference on full waveform tomography for advanced students, researchers and professionals.
Molecular Gas Dynamics-Yoshio Sone 2007-10-16 This self-contained book is an up-to-date description of the basic theory of molecular gas dynamics and its various applications. The book, unique in the literature, presents working knowledge, theory, techniques, and typical phenomena in rarefied gases for theoretical development and application. Basic theory is developed in a systematic way and presented in a form easily applied for practical use. In this work, the ghost effect and non-Navier–Stokes effects are demonstrated for typical examples—Bénard and Taylor–Couette problems—in the context of a new framework. A new type of ghost effect is also discussed.

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