Mechanics of elastic and inelastic solids 4

Robert G. Payton

Elastic wave propagation in transversely isotropic media

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Elastic Wave Propagation In Transversely Isotropic Media

S. Kaliski

Elastic Wave Propagation In Transversely Isotropic Media:

Elastic wave propagation in transversely isotropic media R.C. Payton,2012-12-06 In this monograph I record those parts of the theory of transverse isotropic elastic wave propagation which lend themselves to an exact treatment within the framework of linear theory Emphasis is placed on transient wave motion problems in two and three dimensional unbounded and semibounded solids for which explicit results can be obtained without resort to approximate methods of integration The mathematical techniques used many of which appear here in book form for the first time will be of interest to applied mathematicians engeneers and scientists whose specialty includes crystal acoustics crystal optics magnetogasdynamics dislocation theory seismology and fibre wound composites My interest in the subject of anisotropic wave motion had its origin in the study of small deformations superposed on large deformations of elastic solids By varying the initial stretch in a homogeneously deformed solid it is possible to synthesize aniso tropic materials whose elastic parameters vary continuously The range of the parameter variation is limited by stability considerations in the case of small deformations super posed on large deformation problems and what is essentially the same thing by the of hyperbolicity solids whose parameters allow wave motion for anisotropic notion solids The full implication of hyperbolicity for anisotropic elastic solids has never been previously examined and even now the constraints which it imposes on the elasticity constants have only been examined for the class of transversely isotropic hexagonal crystals materials Elastic wave propagation in transversely isotropic media R.C. Payton,1983-10-31 In this monograph I record those parts of the theory of transverse isotropic elastic wave propagation which lend themselves to an exact treatment within the framework of linear theory Emphasis is placed on transient wave motion problems in two and three dimensional unbounded and semibounded solids for which explicit results can be obtained without resort to approximate methods of integration The mathematical techniques used many of which appear here in book form for the first time will be of interest to applied mathematicians engeneers and scientists whose specialty includes crystal acoustics crystal optics magnetogasdynamics dislocation theory seismology and fibre wound composites My interest in the subject of anisotropic wave motion had its origin in the study of small deformations superposed on large deformations of elastic solids By varying the initial stretch in a homogeneously deformed solid it is possible to synthesize aniso tropic materials whose elastic parameters vary continuously The range of the parameter variation is limited by stability considerations in the case of small deformations super posed on large deformation problems and what is essentially the same thing by the of hyperbolicity solids whose parameters allow wave motion for anisotropic notion solids The full implication of hyperbolicity for anisotropic elastic solids has never been previously examined and even now the constraints which it imposes on the elasticity constants have only been examined for the class of transversely isotropic hexagonal crystals materials **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 *Stress Waves in Transversely Isotropic Media: The Homogeneous Problem* E. R. C. Marques,1986 The homogeneous problem of stress wave propagation in unbounded transversely isotropic media is analyzed By adopting plane wave solutions the conditions for the existence of the solution are established in terms of phase velocities and directions of particle displacements Dispersion relations and group velocities are derived from the phase velocity expressions The deviation angles e g angles between the normals to the adopted plane waves and the actual directions of their propagation are numerically determined for a specific fiber glass epoxy composite A graphical method is introduced for the construction of the wave surfaces using magnitudes of phase velocities and deviation angles The results for the case of isotropic media are shown to be contained in the solutions for the transversely isotropic media **Elastic Wave Propagation** F. McCarthy,M. Hayes,2018-06-20 This volume contains a timely collection of research papers on the latest developments in the ever increasing use of elastic waves in a variety of contexts There are reports on wave propagation in various types of media in both isotropic and anisotropic bodies in homogeneous and inhomogeneous media in media with cracks or inclusions in random media and in layered composites The bulk of the papers are concerned with propagation in elastic media but also included are viscoelastic thermoelastic and magneto electroelastic wave propagation as well as waves in porous and piezo electric bodies Consideration is given to propagation in bodies as diverse as stretched elastic strings to surfaces such as thin walled cylinders and thin films under stress Applications considered include the determination of the depth of cracks analysis of ground motions generated by a finite fault in seismology surface wave spreading on piezo electric solids and dynamical stress intensity factors Most of the papers are theoretical in nature and many are complemented by numerical studies Also included are a general survey on experimental techniques and reports on experimental work The volume will be of interest to those who do theoretical studies of elastic wave propagation and to those who apply elastic waves whether in seismology non destructive testing the fabrication of devices or underwater acoustics etc *Review of Progress in Quantitative Nondestructive Evaluation* Donald O. Thompson,Dale E. Chimenti,2012-12-06 These Proceedings consisting of Parts A and B contain the edited versions of most of the papers presented at the annual Review of Progress in Quantitative Nondestructive Evaluation held at Snowmass Village Colorado on July 31 to August 4 1994 The Review was organized by the Center for NDE at Iowa State University in cooperation with the Ames Laboratory of the US DOE the Materials Directorate of the Wright Laboratory Wright Patterson Air Force Base the American Society of Nondestructive Testing the Department of Energy the National Institute of Standards and Technology the Federal Aviation Administration the National Science Foundation

Industry University Cooperative Research Centers and the Working Group in Quantitative NDE This year s Review of Progress in QNDE was attended by approximately 450 participants from the U S and many foreign countries who presented over 360 papers The meeting was divided into 36 sessions with as many as four sessions running concurrently The Review covered all phases of NDE research and development from fundamental investigations to engineering applications or inspection systems and it included many important methods of inspection science from acoustics to x rays In the last eight to ten years the Review has stabilized at about its current size which most participants seem to agree is large enough to permit a full scale overview of the latest developments but still small enough to retain the collegial atmosphere which has marked the Review since its inception **Third International Conference on Mathematical and Numerical Aspects of Wave Propagation** Gary C. Cohen,1995-01-01 This volume contains the papers presented at the title conference Speakers from 13 different countries were represented at the meeting A broad range of topics in theoretical and applied wave propagation is covered **Advances of New Technologies in Seismic Exploration** Shaoping Lu,Sanyi Yuan,Lingyun Qiu,Xiang Li,Tie Zhong,Xintong Dong ,Peng Guo,2025-10-01 In the past few decades the geophysics community has proposed a large number of new technologies for seismic exploration to meet the needs of high resolution subsurface imaging These new technologies have made great contributions to advances in seismic exploration and structural geology For instance the appearance of distributed optical fiber acoustic sensing DAS makes it possible to acquire seismic data with high spatial resolution at low cost Advances have been made in full waveform inversion FWI and it is now considered the most robust approach for the reconstruction of subsurface velocity models Multiples which were originally regarded as a common noise are now applied to seismic imaging and accordingly provide extra illumination and least square migration LSM greatly improves illumination and resolution of seismic imaging Deep learning especially the convolutional neural network CNN has shown remarkable performance in seismic noise attenuation interpolation velocity model reconstruction arrival time picking and interpretation Although these new technologies have solved certain real world geophysical issues they still have the following limitations Firstly fiber system noise reduces the quality of seismic data received by DAS restricting its further applications Secondly slow convergence rate and huge computational cost are main bottlenecks faced by iterative seismic inversion approaches such as LSM and FWI Moreover the cycle skipping problem is still a challenging issue in FWI Thirdly the weak generalization of trained models needs to be addressed before deep learning can be implemented widely to solve real world problems Forthly the solution of the anisotropic elastic wave equation needs to be improved for its applications in practice

Foundations of Anisotropy for Exploration Seismics K. Helbig,2015-08-11 Over the last few years anisotropy has become a hot topic in seismic exploration and seismology It is now recognised that geological media deviate more or less from isotropy This has consequences for acquisition processing and interpretation of seismic data and also helps determine the cause of anisotropy and adds to our knowledge concerning the structure of the medium at scales beyond the resolution of

the seismic method This volume addresses the theoretical foundations of wave propagation in anisotropic media at an easily accessible level The treatment is not restricted to exploration seismology The book commences with fundamental material and covers the description of wave propagation in anisotropic conditions by means of slowness and wave surfaces It continues to explore the theory of elasticity the interaction of elasticity and material symmetry and conditions imposed by the stability of the medium Wave propagation in general anisotropic solids are discussed referring in particular to singular and longitudinal directions Slowness and wave surfaces in transversely isotropic media and in the planes of symmetry of orthorhombic media is presented and then moves on to wave propagation in orthorhombic media by means of squared slowness surfaces The latter part of the book deals with layer induced anisotropy showing how a particular internal structure of a medium leads to anisotropy and how much of this structure can be recovered by inversion of the modelling algorithm A few fundamental aspects of exploration seismology are also discussed The final chapter discusses how concepts which were developed by Kelvin but only recently understood can be utilised to determine the symmetry class and orientation of an elastic medium Anisotropic Elasticity Thomas C. T. Ting,1996-02-15 Anisotropic Elasticity offers for the first time a comprehensive survey of the analysis of anisotropic materials that can have up to twenty one elastic constants Focusing on the mathematically elegant and technically powerful Stroh formalism as a means to understanding the subject the author tackles a broad range of key topics including antiplane deformations Green s functions stress singularities in composite materials elliptic inclusions cracks thermo elasticity and piezoelectric materials among many others Well written theoretically rigorous and practically oriented the book will be welcomed by students and researchers alike *Elastic Waves in the Earth* Walter L. Pilant,2012-12-02 Elastic Waves in the Earth provides information on the relationship between seismology and geophysics and their general aspects The book offers elastodynamic equations and derivative equations that can be used in the propagation of elastic waves It also covers major topics in detail such as the fundamentals of elastodynamics the Lamb s problem which includes the Cagniard de Hoop theory rays and modes in a radially inhomogeneous earth and in multilayered media which includes the Thomson Haskell theory the elastic wave dissipation the seismic source and noise and the seismographs The book consists of 33 chapters The first 16 chapters include basic material related to the propagation of elastic waves Topics covered by these chapters include scalars vectors and tensors in cartesian coordinates stress and strain analysis equations of elasticity and motion plane waves Rayleigh waves plane wave theory and fluid fluid and solid solid interfaces The second half of the book covers various ray and mode theories elastic wave dissipation and the observations and theories of seismic source and seismic noise It concludes by discussing earthquake seismology and different seismographs like the pendulum seismometer and the strain seismometer **Mathematical Methods and Modelling in Applied Sciences** Mehmet Zeki Sarıkaya,Hemen Dutta,Ahmet Ocak Akdemir,Hari M. Srivastava,2020-03-02 This book presents a collection of original research papers from the 2nd International Conference on Mathematical and

Related Sciences held in Antalya Turkey on 27 30 April 2019 and sponsored supported by D zce University Turkey the University of Jordan and the Institute of Applied Mathematics Baku State University Azerbaijan The book focuses on various types of mathematical methods and models in applied sciences new mathematical tools techniques and algorithms related to various branches of applied sciences and important aspects of applied mathematical analysis It covers mathematical models and modelling methods related to areas such as networks intelligent systems population dynamics medical science and engineering as well as a wide variety of analytical and numerical methods The conference aimed to foster cooperation among students researchers and experts from diverse areas of mathematics and related sciences and to promote fruitful exchanges on crucial research in the field This book is a valuable resource for graduate students researchers and educators interested in applied mathematics and interactions of mathematics with other branches of science to provide insights into analysing modelling and solving various scientific problems in applied sciences Theoretical And Computational Acoustics '95 Ding Lee,Yih-hsing Pao,Martin H Schultz,Yu-chiung Teng,1996-08-30 This conference provided a forum for active researchers to discuss the state of the art in theoretical and computational acoustics Topics covered fluid elastic interface theoretical and computational aspects with applications seismic waves and earthquake studies modeling theoretical and computational aspects for multidimensional wave propagation methods for computational acoustics structural acoustics scattering and inverse problems solutions to acoustic problems by supercomputers and parallel processing and application of neural networks to acoustics **Vibrations and Waves (Part B: Waves)** S. Kaliski,2013-10-22 This book gives a comprehensive overview of wave phenomena in different media with interacting mechanical electromagnetic and other fields Equations describing wave propagation in linear and non linear elastic media are followed by equations of rheological models models with internal rotational degrees of freedom and non local interactions Equations for coupled fields thermal elastic electromagnetic piezoelectric and magneto spin with adequate boundary conditions are also included Together with its companion volume Vibrations and Waves Part A Vibrations this work provides a wealth of information about dynamical phenomena in different media and fields which will be of considerable interest to both scientists and graduate students **Seismic Wave Propagation** J. E. White,2000 **Poromechanics** J.F. Thimus,et al,2020-12-18 This text features 105 papers dealing with the fundamentals and the applications of poromechanics from the Biot conference of 1998 held in Louvain la Neuve Topics include wave propogation numerical modelling identification of poromechanical parameters and constitutive modelling **Frontiers in Industrial and Applied Mathematics** Rajesh Kumar Sharma,Lorenzo Pareschi,Abdon Atangana,Bikash Sahoo,Vijay Kumar Kukreja,2023-02-02 This book publishes select papers presented at the 4th International Conference on Frontiers in Industrial and Applied Mathematics FIAM 2021 held at the Sant Longowal Institute of Engineering and Technology Longowal Punjab India from 21 22 December 2021 Most of the papers deal with mathematical theory embedded with its applications to engineering and sciences This book illustrates numerical simulation

of scientific problems and the state of the art research in industrial and applied mathematics including various computational and modeling techniques with case studies and concrete examples Graduate students and researchers who are interested in real applications of mathematics in the areas of computational and theoretical fluid dynamics solid mechanics optimization and operations research numerical analysis bio mathematics fuzzy control and systems theory dynamical systems and nonlinear analysis algebra and approximation theory will find the book useful Structure of the Lithosphere and Deep Processes Hong Dawei,2020-08-26 This book is a collection of papers presented in the 30th International Geological Congress held in Beijing on structure of the lithosphere and deep processes The papers deal with topics on the measurement of P wave velocities in rocks and elastic properties of crust and upper mantle **Shale Oil and Shale Gas Resources** José A. Torres,Hector Klie,2020-05-23 This multidisciplinary book covers a wide range of topics addressing critical challenges for advancing the understanding and management of shale oil and shale gas resources Both fundamental and practical issues are considered By covering a variety of technical topics we aim to contribute to building a more integrated perspective to meet major challenges faced by shale resources Combining complementary techniques and examining multiple sources of data serve to advance our current knowledge about these unconventional reservoirs The book is a result of interdisciplinary and collaborative work The content includes contributions authored by active scientists with ample expertise in their fields Each article was carefully peer reviewed by researchers and the editorial process was performed by an experienced team of Senior Editors Guest Editors Topic Editors and Editorial Board Members The first part is devoted to fundamental topics mostly investigated on the laboratory scale The second part elaborates on larger scales at near wellbore and field scales Finally two related technologies which could be relevant for shale plays applications are presented With this Special Issue we provide a channel for sharing information and lessons learned collected from different plays and from different disciplines

Structure of the Lithosphere and Deep Processes Dawei Hong,1997-09 This book is a collection of papers presented in the 30th International Geological Congress held in Beijing on structure of the lithosphere and deep processes The papers deal with topics on the measurement of P wave velocities in rocks and elastic properties of crust and upper mantle

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