# Fundamentals Of Borehole Seismic Technology

*Updated and expanded edition including new chapters on the cutting edge research areas of soil structure interaction (SSI) and fragility formulations Earthquake Engineering: From Source to Fragility, 2nd Edition combines aspects of engineering seismology, structural and geotechnical earthquake engineering to assemble the vital components required for a deep understanding of response of structures to earthquake ground motion: from the seismic source to the evaluation of actions and deformation required for design. Basic concepts for accounting for the effects of soil-structure interaction effects in seismic design and assessment are covered in detail. Also included is material on the nature of earthquake sources and mechanisms, various methods for the characterization of earthquake input motion, effects of soil-structure interaction, damage observed in reconnaissance missions, modeling of structures for the purposes of response simulation, definition of performance limit states, fragility curve derivations, structural and architectural systems for optimal seismic response, and action and deformation quantities suitable for design. Earthquake Engineering: From Source to Fragility, 2nd Edition has been updated to include two new chapters. The first on soil structure interaction (SSI) illustrates the factors affecting the SSI and the effects of SSI on ground motion and comprehensively discusses the existing models for soil and foundation systems. The second new chapter deals with fragility formulations, a topic which is at the cutting-edge of modern seismic risk assessment. This book is accompanied by a website containing a comprehensive set of slides illustrating the chapters and appendices, as well as a set of problems with solutions and worked-through examples. Updated and expanded edition including new chapters on the cutting edge research areas of soil structure interaction (SSI) and fragility formulations Combines aspects of engineering seismology, structural and geotechnical earthquake engineering to provide an understanding of the response of structures to earthquake ground motion Each chapter is written within the framework from source (of earthquakes) to societal consequences Accompanied by a website hosting slides, problem sets with solutions and worked-through examples A reference for practising structural engineers and architects, building code developers. Graduate students in earthquake, geotechnical and structural engineering departments.*

*In the modem language of reservoir engineering by reservoir description is understood the totality of basic local information concerning the reservoir rock and fluids which by various procedures are extrapolated over the entire reservoir. Fracture detection, evaluation and processing is another essential step in the process of fractured reservoir description. In chapter 2, all parameters related to fracture density and fracture intensity, together with various procedures of data processing are discussed in detail. After a number of field examples, developed in Chap. 3, the main objective remains the quantitative evaluation of physical properties. This is done in Chap. 4, where the evaluation of fractures porosity and permeability, their correlation and the equivalent ideal geometrical models versus those parameters are discussed in great detail. Special rock properties such as capillary pressure and relative permeability are reexamined in the light of a double-porosity reservoir rock. In order to complete the results obtained by direct measurements on rock samples, Chap. 5 examines fracturing through indirect measurements from various logging results. The entire material contained in these five chapters defines the basic physical parameters and indicates procedures for their evaluation which may be used further in the description of fractured reservoirs.*

*The present book is the author's third on the subject of vertical seismic profiling (VSP). Ten years have elapsed since the pUblication of the first book. During this period, VSP has become the principal method of seismic observations in boreholes and the chief method of experimental studies of seismic waves in the real earth. VSP combines borehole studies in the seismic frequency band, well velocity surveys, proximity or aplanatic surveys, all of which previously existed as separate methods. The high effectiveness ofVSP, its great practical value, the express nature and clarity of the results obtained have all contributed towards a very rapid acceptance of the method. In the USSR VSP has been used in an overwhelming majority of areas and is being used increasingly in many foreign countries as well. This has been greatly facilitated by the translation into English and the publication in the U. S. A. by the Society of Exploration Geophysicists of the book Vertical Seismic Profiling (Tulsa, Oklahoma, 1974). As the method has become more familiar, it has attracted growing interest outside the USSR This has been substantiated by the special seminar on VSP (Oklahoma, 1979) which was organized for 22 U. S. companies and universities and presented by the author.*

*Review of the second edition "For geologists and geophysicists studying sedimentary fill of basins, this volume is a valuable addition to their shelves. The book is packed with informationincludes numerous lists of references, and is up-to-date. As a source volume, this book is second to none. It is clear and well organized." GEOPHYSICS*

*This ground-breaking work is the first to cover the fundamentals of hydrogeophysics from both the hydrogeological and geophysical perspectives. Authored by leading experts and expert groups, the book starts out by explaining the fundamentals of hydrological characterization, with focus on hydrological data acquisition and measurement analysis as well as geostatistical approaches. The fundamentals of geophysical characterization are then at length, including the geophysical techniques that are often used for hydrogeological characterization. Unlike other books, the geophysical methods and petrophysical discussions presented here emphasize the theory, assumptions, approaches, and interpretations that are particularly important for hydrogeological applications. A series of hydrogeophysical case studies illustrate hydrogeophysical approaches for mapping hydrological units, estimation of hydrogeological parameters, and monitoring of hydrogeological processes. Finally, the book concludes with hydrogeophysical frontiers, i.e. on emerging technologies and stochastic hydrogeophysical inversion approaches.*

*Covers the fundamentals of all currently used methods (seismic, electrical, electromagnetic, gravity, magnetic, borehole logging and remote sensing) and pays special attention to the seismic refraction and electrical resistivity techniques which are the ones most commonly used in engineering and groundwater geophysics. The main changes in this new edition of Applied Geophysics for Engineers and Geologists, apart from a general updating, and conversion to SI units, is a more extensive treatment of electromagnetic and induced polarisation methods, and of geophysical borehole logging. The seismic reflection method is also treated more fully in view of its great importance in petroleum prospecting. Problems, with answers are also included. Taken together, the changes are so great that this is virtually a new book, as is suggested by the change in title*

*The purpose of this book is to give a theoretical and practical introduction to seismic-while-drilling by using the drill-bit noise. This recent technology offers important products for geophysical control of drilling. It involves aspects typical of borehole seismics and of the drilling control surveying, hitherto the sole domain of mudlogging. For aspects related to the drill-bit source performance and borehole acoustics, the book attempts to provide a connection between experts working in geophysics and in drilling. There are different ways of thinking related to basic knowledge, operational procedures and precision in the observation of the physical quantities. The goal of the book is to help "build a bridge" between geophysicists involved in seismic while drilling - who may need to familiarize themselves with methods and procedures of drilling and drilling-rock mechanics - and drillers involved in geosteering and drilling of "smart wells" - who may have to familiarize themselves with seismic signals, wave resolution and radiation. For instance, an argument of common interest for drilling and seismic while drilling studies is the monitoring of the drill-string and bit vibrations. This volume contains a large number of real examples of SWD data analysis and applications.*

***Technical Program***
***Wave Fields in Real Media***
***Fundamentals of Geophysics***
***Microseismic Monitoring***
***Evolutionary and Revolutionary Technologies for Mining***
***Fundamentals of Geophysical Interpretation***
***Was It Worth It? Energy Efficiency and Fossil Energy Research 1978 to 2000***
***Energy Research at DOE***
***Fundamentals of Seismic Tomography***
***Fundamentals of Borehole Seismic Geology***
***Hydrogeophysics***

**Well Placement Fundamentals provides a reference for petrotechnical experts involved in the real-time positioning of wellbores using LWD data and geological criteria. Chapters on geology, drilling, MWD and LWD provide the fundamental cross-domain knowledge required for successful well placement operations. The three techniques of well placement; model-compare-update, real-time dip determination, and remote boundary detection, are detailed along with several case studies demonstrating the impact of appropriate application of well placement technology, process and petrotechnical expertise. The book is intended for distribution to clients to help explain our services and techniques, as pre-course reading for students attending well placement training and as a reference for those interested in productive drilling.**

**An overview of the geophysical techniques and analysis methods for monitoring subsurface carbon dioxide storage for researchers and industry practitioners.**

**The most complete, one-stop reference for fiber optic sensor theory and application Optical Fiber Sensors: Fundamentals for Development of Optimized Devices constitutes the most complete, comprehensive, and up-to-date reference on the development of optical fiber sensors. Edited by two respected experts in the field and authored by experienced engineers and scientists, the book acts as a guide and a reference for an audience ranging from graduate students to researchers and engineers in the field of fiber optic sensors. The book discusses the fundamentals and foundations of fiber optic sensor technology and provides real-world examples to illuminate and illustrate the concepts found within. In addition to the basic concepts necessary to understand this technology, Optical Fiber Sensors includes chapters on: Distributed sensing with Rayleigh, Raman and Brillouin scattering methods Biomechanical sensing Gas and volatile organic compound sensors Application of nanotechnology to optical fiber sensors Health care and clinical diagnosis And others Graduate students as well as professionals who work with optical fiber sensors will find this volume to be an indispensable resource and reference.**

**Acoustic logging is a multidisciplinary technology involving basic theory, instrumentation, and data processing/interpretation methodologies. The advancement of the technology now allows for a broad range of measurements to obtain formation properties such as elastic wave velocity and attenuation, formation permeability, and seismic anisotropy that are important for petroleum reservoir exploration. With these advances, it is easier to detect and characterize formation fractures, estimate formation stress field, and locate/estimate petroleum reserves. The technology has evolved from the monopole acoustic logging into the multipole, including dipole, cross-dipole, and even quadrupole, acoustic logging measurements. The measurement process has developed from the conventional wireline logging into the logging-while-drilling stage. For such a fast developing technology with applications that are interesting to readers of different backgrounds, it is necessary to have systematic documentation of the discipline, including the theory, methods, and applications, as well as the technology's past, present, and near future development trends. Quantitative Borehole Acoustic Methods provides such documentation, with emphasis on the development over the past decade. Although considerable effort has been made to provide a thorough basis for the theory and methodology development, emphasis is placed on the applications of the developed methods. The applications are illustrated with field data examples. Many of the acoustic waveform analysis/processing methods described in the book are now widely used in the well logging industry.**

**The Office of Industrial Technologies (OIT) of the U. S. Department of Energy commissioned the National Research Council (NRC) to undertake a study on required technologies for the Mining Industries of the Future Program to complement information provided to the program by the National Mining Association. Subsequently, the National Institute for Occupational Safety and Health also became a sponsor of this study, and the Statement of Task was expanded to include health and safety. The overall objectives of this study are: (a) to review available information on the U.S. mining industry; (b) to identify critical research and development needs related to the exploration, mining, and processing of coal, minerals, and metals; and (c) to examine the federal contribution to research and development in mining processes.**

**The Handbook of Borehole Acoustics and Rock Physics for Reservoir Characterization combines in a single useful handbook the multidisciplinary domains of the petroleum industry, including the fundamental concepts of rock physics, acoustic logging, waveform processing, and geophysical application modeling through graphical examples derived from field data. It includes results from core studies, together with graphics that validate and support the modeling process, and explores all possible facets of acoustic applications in reservoir evaluation for hydrocarbon exploration, development, and drilling support. The Handbook of Borehole Acoustics and Rock Physics for Reservoir Characterization serves as a technical guide and research reference for oil and gas professionals, scientists, and students in the multidisciplinary field of reservoir characterization through the use of petrosonics. It overviews the fundamentals of borehole acoustics and rock physics, with a focus on reservoir evaluation applications, explores current advancements through updated research, and identifies areas of future growth. Presents theory, application, and limitations of borehole acoustics and rock physics through field examples and case studies Features "Petrosonic Workflows" for various acoustic applications and evaluations, which can be easily adapted for practical reservoir modeling and interpretation Covers the potential advantages of acoustic-based techniques and summarizes key results for easy geophysical application**

**This book explains physical principles, unique benefits, broad categories, implementation aspects, and performance criteria of distributed optical fiber sensors (DOFS). For each kind of sensor, the book highlights industrial applications, which range from oil and gas production to power line monitoring, plant and process engineering, environmental monitoring, industrial fire and leakage detection, and so on. The text also includes a discussion of such key areas as backscattering, launched power limitations, and receiver sensitivity, as well as a concise historical account of the field's development.**

**Seismic While Drilling**
**Methods and Applications in Reservoir Geophysics**
**Fundamentals for Development of Optimized Devices**
**Earth Science: The physics and chemistry of earth**
**Principles of Sedimentary Basin Analysis**
**The Elements of Geophysical Prospecting**
**Passive Seismic Monitoring of Induced Seismicity**
**Fundamentals of Fractured Reservoir Engineering**
**Information-Based Inversion and Processing with Applications**
**Geophysics and Geosequestration**
**Fundamentals of Production Logging**

*How will we meet rising energy demands? What are our options? Are there viable long-term solutions for the future? Learn the fundamental physical, chemical and materials science at the heart of: • Renewable/non-renewable energy sources • Future transportation systems • Energy efficiency • Energy storage Whether you are a student taking an energy course or a newcomer to the field, this textbook will help you understand critical relationships between the environment, energy and sustainability. Leading experts provide comprehensive coverage of each topic, bringing together diverse subject matter by integrating theory with engaging insights. Each chapter includes helpful features to aid understanding, including a historical overview to provide context, suggested further reading and questions for discussion. Every subject is beautifully illustrated and brought to life with full color images and color-coded sections for easy browsing, making this a complete educational package. Fundamentals of Materials for Energy and Environmental Sustainability will enable today's scientists and educate future generations.*

*The interest in seismic stratigraphic techniques to interpret reflection datasets is well established. The advent of sophisticated subsurface reservoir studies and 4D monitoring, for optimising the hydrocarbon production in existing fields, does demonstrate the importance of the 3D seismic methodology. The added value of reflection seismics to the petroleum industry has clearly been proven over the last decades. Seismic profiles and 3D cubes form a vast and robust data source to unravel the structure of the subsurface. It gets nowadays exploited in ever greater detail. Larger offsets and velocity anisotropy effects give for instance access to more details on reservoir flow properties like fracture density, porosity and permeability distribution, Elastic inversion and modelling may tell something about the change in petrophysical parameters. Seismic investigations provide a vital tool for the delineation of subtle hydrocarbon traps. They are the basis for understanding the regional basin framework and the stratigraphic subdivision. Seismic stratigraphy combines two very different scales of observation: the seismic and well-control. The systematic approach applied in seismic stratigraphy explains why many workers are using the principles to evaluate their seismic observations. The here presented modern geophysical techniques allow more accurate prediction of the changes in subsurface geology. Dynamics of sedimentary environments are discussed with its relation to global controling factors and a link is made to high-resolution sequence stratigraphy. 'Seismic Stratigraphy Basin Analysis and Reservoir Characterisation' summarizes basic seismic interpretation techniques and demonstrates the benefits of intergrated reservoir studies for hydrocarbon exploration. Topics are presented from a practical point of view and are supported by well-illustrated case histories. The reader (student as well as professional geophysicists, geologists and reservoir engineers) is taken from a basic level to more advanced study techniques. * Overview reflection seismic methods and its limitations. * Link between basic seismic stratigraphic principles and high resolution sequence stratigraphy. * Description of various techniques for seismic reservoir characterization and synthetic modelling. * Overview nversion techniques, AVO and seismic attributes analysis.*

*Fundamentals of Borehole Seismic GeologySeismic While DrillingFundamentals of Drill-Bit Seismic for ExplorationElsevier*

*Seismic inversion aims to reconstruct a quantitative model of the Earth subsurface, by solving an inverse problem based on seismic measurements. There are at least three fundamental issues to be solved simultaneously: non-linearity, non-uniqueness, and instability. This book covers the basic theory and techniques used in seismic inversion, corresponding to these three issues, emphasising the physical interpretation of theoretical concepts and practical solutions. This book is written for master and doctoral students who need to understand the mathematical tools and the engineering aspects of the inverse problem needed to obtain geophysically meaningful solutions. Building on the basic theory of linear inverse problems, the methodologies of seismic inversion are explained in detail, including ray-impedance inversion and waveform tomography etc. The application methodologies are categorised into convolutional and wave-equation based groups. This systematic presentation simplifies the subject and enables an in-depth understanding of seismic inversion. This book also provides a practical guide to reservoir geophysicists who are attempting quantitative reservoir characterisation based on seismic data. Philosophically, the seismic inverse problem allows for a range of possible solutions, but the techniques described herein enable geophysicists to exclude models that cannot satisfy the available data. This book summarises the author's extensive experience in both industry and academia and includes innovative techniques not previously published.*

*The material in this volume provides the basic theory necessary to understand the principles behind imaging the subsurface of the Earth using reflection and refraction seismology. For reflection seismology, the end product is a "record section" from a collection of "wiggly traces" that are recorded in the field from which information about the properties of subsurface structure and rock can be derived. For the most part, the principles of imaging are the same regardless of the depth to the target; the same mathematical background is necessary for targeting a shallow water table as for investigating the base of the earth's continental "crust" at a depth of 30-50 km.*

*In legislation appropriating funds for DOE's fiscal year (FY) 2000 energy R&D budget, the House Interior Appropriations Subcommittee directed an evaluation of the benefits that have accrued to the nation from the R&D conducted since 1978 in DOE's energy efficiency and fossil energy programs. In response to the congressional charge, the National Research Council formed the Committee on Benefits of DOE R&D on Energy Efficiency and Fossil Energy. From its inception, DOE's energy R&D program has been the subject of many outside evaluations. The present evaluation asks whether the benefits of the program have justified the considerable expenditure of public funds since DOE's formation in 1977, and, unlike earlier evaluations, it takes a comprehensive look at the actual outcomes of DOE's research over two decades.*

*An introduction to the principles and applications of passive seismic monitoring, providing an accessible overview of current research and technology.*

*with MATHEMATICA Notebooks and Examples on CD-ROM*

*Applied Geophysics for Geologists and Engineers*
*Fundamentals of Earthquake Engineering*
*Near-surface Geophysics*
*Well Placement Fundamentals*
*Seismic Inversion*
*Understanding Downhole Microseismic Data Analysis*
*Theory and Applications*
*With Applications in Hydraulic Fracture Monitoring*
*Basic Theory in Reflection Seismology*

This book is designed as an excellent resource text for students and professionals, providing an in-depth overview of the theory and applications of downhole microseismic monitoring of hydraulic fracturing. The readers will benefit greatly from the detailed explanation on the processes and workflows involved in the acquisition design modeling, processing and interpretation of microseismic data.

This hand guide in the Gulf Drilling Guides series offers practical techniques that are valuable to petrophysicists and engineers in their day-to-day jobs. Based on the author's many years of experience working in oil companies around the world, this guide is a comprehensive collection of techniques and rules of thumb that work. The primary functions of the drilling or petroleum engineer are to ensure that th operational decisions are made during the course of drilling and testing a well, from data gathering, completion and testing, and thereafter to provide the necessary parameters to enable an accurate static and dynamic model of the reservoir to be constructed. This guide supplies these, and many other, answers to their everyday problems. There are chapters on NMR logging, core analysis, sampling, and in data to give the engineer a full picture of the formation. There is no other single guide like this, covering all aspects of well logging and formation evaluation, completely updated with the latest techniques and applications. · A valuable reference dedicated solely to well logging and formation evaluation. · Comprehensive coverage of the latest technologies and practices, including, troubleshooting for stuck pip decisions, and logging contracts. · Packed with money-saving and time saving strategies for the engineer working in the field.

Seismic While Drilling: Fundamentals of Drill-Bit Seismic for Exploration, Second Edition gives a theoretical and practical introduction to seismic while drilling by using drill-bit noise. The goal is to support the geophysical control of drilling, and to build a bridge between geophysicists involved in seismic while drilling and drillers. This revised and extended edition includes new topics such as novel drilling techn downhole communication, ground-force drill-bit measurement, and SWD seismic interferometry. Like the first edition, Seismic While Drilling, 2nd edition also includes real-life examples of SWD data analysis and application. Addresses fundamental knowledge on geophysical principles related to acoustics and seismic waves as well as basic borehole waves and drilling Includes new technological and metho developments since publication of the first edition Provides new examples for applications in geothermal and analysis of diffractions, offshore marine, and tunnel seismic while drilling (TSWD)

Time Lapse Approach to Monitoring Oil, Gas, and CO2 Storage by Seismic Methods delivers a new technology to geoscientists, well logging experts, and reservoir engineers, giving them a new basis on which to influence decisions on oil and gas reservoir management. Named ACROSS (Accurately Controlled and Routinely Operated Signal System), this new evaluation method is presented to address mo such as shale and heavy oil. The book also discusses prolonged production methods for enhanced oil recovery. The monitoring of storage zones for carbon capture are also included, all helping the petroleum and reservoir engineer to fully extend the life of a field and locate untapped pockets of additional oil and gas resources. Rounded out with case studies from locations such as Japan, Saudi Arabia, and will help readers, scientists, and engineers alike to better manage the life of their oil and gas resources and reservoirs. Benefits both geoscientists and reservoir engineers to optimize complex reservoirs such as shale and heavy oil Explains a more accurate and cost efficient reservoir monitoring technology called ACROSS (Accurately Controlled and Routinely Operated Signal System) Illustrates real-world multiple case studies from around the world

This tutorial or practical guide on seismic tomography is aimed at an audience familiar with basic seismology concepts and calculus. The intent is to provide the reader with a fundamental understanding of both seismic ray tomography and seismic diffraction tomography. Case studies illustrate processing method-ology, basic interpretation technique, and pitfalls. After reading through this presentation, one w understanding of and appreciation for seismic tomography articles found in the literature.

3C seismic applications provide enhanced rock property characterization of the reservoir that can complement P-wave methods. Continued interest in converted P- to S-waves (PS-waves) and vertical seismic profiles (VSPs) has resulted in the steady development of advanced vector wavefield techniques. PS-wave images along with VSP data can be used to help P-wave interpretation of structure in gas o and fluid properties for lithology discrimination from S-wave impedance and density inversion in unconventional reservoirs, and of fracture characterization and stress monitoring from S-wave birefringence (splitting) analysis. The book, which accompanies the 2016 SEG Distinguished Instructor Short Course, presents an overview of 3C seismic theory and practical application: from fundamentals of PS-wave through to acquisition and processing including interpretation techniques. The emphasis is on unique aspects of vector wavefields, anisotropy, and the important relationships that unify S-waves and P-waves. Various applications and case studies demonstrate image benefits from PS-waves, elastic properties and fluid discrimination from joint inversion of amplitude variations with offset/angle (AVO/A), and V anisotropic velocity model building and improved reservoir imaging. The book will be of interest to geophysicists, geologists, and engineers, especially those involved with or considering the use of AVO/A inversion, fracture/stress characterization analyses, or interpretation in gas-obscured reservoirs.

A practical handbook for the petroleum geophysicist. Fundamental concepts are explained using heuristic descriptions of seismic modeling, deconvolution, depth migration, and tomography. Pitfalls in processing and contouring are described briefly. Applications include petroleum exploration of carbonate reefs, salt intrusions, and overthrust faults. The book includes past, present, and possible future develo

Time Lapse Approach to Monitoring Oil, Gas, and CO2 Storage by Seismic Methods
Fundamental Principles and Application to Energy Technologies
Well Logging and Formation Evaluation
From Source to Fragility
Handbook of Borehole Acoustics and Rock Physics for Reservoir Characterization
Vertical Seismic Profiling and Its Exploration Potential
Fundamentals of the Petrophysics of Oil and Gas Reservoirs
Fundamentals of Gas Shale Reservoirs
Cumulative Index Geophysics, Journal of the Society of Exploration Geophysicists (1936-1988 Inclusive) : Early Geophysical Papers : Geophysics, the Leading Edge of Exploration (selected Papers, 1982-88 Inclusive) ...
Wave Propagation in Anisotropic, Anelastic, Porous and Electromagnetic Media
Fundamentals of Drill-Bit Seismic for Exploration

***Written by some of the world's most renowned petroleum andenvironmental engineers, Petrophysics: The Fundamentals of Oiland Gas Revervoirs is the first book to offer the practicingengineer and engineering student these new cutting-edge techniquesfor prediction and forecasting in petroleum engineering andenvironmental management.***

***Information-Based Inversion and Processing with Applications examines different classical and modern aspects of geophysical data processing and inversion with emphasis on the processing of seismic records in applied seismology. Chapter 1 introduces basic concepts including: probability theory (expectation operator and ensemble statistics), elementary principles of parameter estimation, Fourier and z-transform essentials, and issues of orthogonality. In Chapter 2, the linear treatment of time series is provided. Particular attention is paid to Wold decomposition theorem and time series models (AR, MA, and ARMA) and their connection to seismic data analysis problems. Chapter 3 introduces concepts of Information theory and contains a synopsis of those topics that are used throughout the book. Examples are entropy, conditional entropy, Burg's maximum entropy spectral estimator, and mutual information. Chapter 4 provides a description of inverse problems first from a deterministic point of view, then from a probabilistic one. Chapter 5 deals with methods to improve the signal-to-noise ratio of seismic records. Concepts from previous chapters are put in practice for designing prediction error filters for noise attenuation and high-resolution Radon operators. Chapter 6 deals with the topic of deconvolution and the inversion of acoustic impedance. The first part discusses band-limited extrapolation assuming a known wavelet and considers the issue of wavelet estimation. The second part deals with sparse deconvolution using various 'entropy' type norms. Finally, Chapter 7 introduces recent topics of interest to the authors. The emphasis of this book is on applied seismology but researchers in the area of global seismology, and geophysical signal processing and inversion will find material that is relevant to the ubiquitous problem of estimating complex models from a limited number of noisy observations. Non-conventional approaches to data processing and inversion are presented Important problems in the area of seismic resolution enhancement are discussed Contains research material that could inspire graduate students and their supervisors to undertake new research directions in applied seismology and geophysical signal processing***

***This second edition of Fundamentals of Geophysics has been completely revised and updated, and is the ideal geophysics textbook for undergraduate students of geoscience with an introductory level of knowledge in physics and mathematics. It gives a comprehensive treatment of the fundamental principles of each major branch of geophysics, and presents geophysics within the wider context of plate tectonics, geodynamics and planetary science. Basic principles are explained with the aid of numerous figures and step-by-step mathematical treatments, and important geophysical results are illustrated with examples from the scientific literature. Text-boxes are used for auxiliary explanations and to handle topics of interest for more advanced students. This new edition also includes review questions at the end of each chapter to help assess the reader's understanding of the topics covered and quantitative exercises for more thorough evaluation. Solutions to the exercises and electronic copies of the figures are available at www.cambridge.org/9780521859028.***

***This book examines the differences between an ideal and a real description of wave propagation, where ideal means an elastic (lossless), isotropic and single-phase medium, and real means an anelastic, anisotropic and multi-phase medium. The analysis starts by introducing the relevant stress-strain relation. This relation and the equations of momentum conservation are combined to give the equation of motion. The differential formulation is written in terms of memory variables, and Biot's theory is used to describe wave propagation in porous media. For each rheology, a plane-wave analysis is performed in order to understand the physics of wave propagation. The book contains a review of the main direct numerical methods for solving the equation of motion in the time and space domains. The emphasis is on geophysical applications for seismic exploration, but researchers in the fields of earthquake seismology, rock acoustics, and material science - including many branches of acoustics of fluids and solids - may also find this text useful. * Presents the fundamentals of wave propagation in anisotropic, anelastic and porus media * Contains a new chapter on the analogy between acoustic and electromagnetic waves, incorporating the subject of electromagnetic waves * Emphasizes geophysics, particularly, seismic exploration for hydrocarbon reservoirs, which is essential for exploration and production of oil***

***Over the past decade, microseismic monitoring, a technology developed for evaluating completions of wells drilled to produce hydrocarbons from unconventional reservoirs, has grown increasingly popular among oil and gas companies. Microseismic Monitoring, by Vladimir Grechka and Werner M. Heigl, discusses how to process microseismic data, what can and cannot be inferred from such data, and to what level of certainty this might be possible. The narrative of the book follows the passage of seismic waves: from a source triggered by hydraulic fracture stimulation, through hydrocarbon-bearing formations, towards motion sensors. The waves' characteristics encode the location of their source and its focal mechanism. The analysis of various approaches to harvesting the source-related information from microseismic records has singled out the accuracy of the velocity model, fully accounting for the strong elastic anisotropy of hydraulically fractured shales, as the most critical ingredient for obtaining precise source locations and interpretable moment tensors. The ray theory complemented by its modern extensions, paraxial and Fréchet ray tracing, provides the only practical means available today for building such models. The book is written for geophysicists interested in learning and applying advanced microseismic data-processing techniques.***

***Presents cross-referenced essays on basic topics related to planetology and Earth from space; each essay includes an annotated bibliography.***

***Expanded Abstracts with Biographies***
***3C Seismic and VSP: Converted waves and vector wavefield applications***
***An Introduction to Distributed Optical Fibre Sensors***
***Quantitative Borehole Acoustic Methods***
***Optical Fibre Sensors***
***Seismic Stratigraphy, Basin Analysis and Reservoir Characterisation***
***Fundamentals of Materials for Energy and Environmental Sustainability***