An Introduction To Velocity Model Building By Ian Lones Isbn 978

by Professor Poul Harremoes Environmental engineering has been a discipline dominated by empirical approaches to engineering. Historically speaking, the development of urban drainage structures was very successful on the basis of pure empiricism. Just think of the impressive structures built by the Romans long before the discipline of hydraulics came into being. The fact is that the Romans did not know much about the theories of hydraulics, which were discovered as late as the mid-1800s. However, with the Renaissance came a new era. Astronomy (Galileos) and basic physics (Newton) started the scientific revolution and in the mid-1800s Navier and Stokes developed the application of Newtons laws to hydrodynamics, and later, St. Venant the first basic physics description of the motion of water in open channels. The combination of basic physical understanding of the phenomena involved in the flow of water in pipes and the experience gained by "trial and error", the engineering approach to urban drainage improved the design and performance of the engineering drainage infrastructure. However, due to the mathematical complications of the basic equations, solutions were available only to quite simple cases of practical significance until the introduction of new principles of calculation made possible by computers and their ability to crunch numbers. Now even intricate hydraulic phenomena can be simulated with a reasonable degree of confidence that the simulations are in agreement with performance in practice, if the models are adequately calibrated with sample performance data.

An Introduction to Numerical Weather Prediction Techniques is unique in the meteorological field as it presents for the first time theories and software of complex dynamical and physical processes required for numerical modeling. It was first prepared as a manual for the training of the World Meteorological Organization's programs at a similar level. This new book updates these exercises and also includes the latest data sets. This book covers important aspects of numerical weather prediction techniques required at an introductory level. These techniques, ranging from simple one-dimensional space derivative to complex numerical models, are first described in theory and for most cases supported by fully tested computational software. The text discusses the fundamental physical parameterizations needed in numerical weather models, such as cumulus convection, radiative transfers, and surface energy fluxes calculations. The book gives the user all the necessary elements to build a numerical model. An Introduction to Numerical Weather Prediction Techniques is rich in illustrations, especially tables showing outputs from each individual algorithm presented. Selected figures using actual meteorological data are also used. This book is primarily intended for senior-level undergraduates and first-year graduate students in meteorology. It is also excellent for individual scientists who wish to use the book for self-study. Scientists dealing with geophysical data analysis or predictive models will find this book filled with useful techniques and data-processing algorithms.

This is the completely updated revision of the highly regarded book Exploration Seismology. Available now in one volume, this textbook provides a complete and systematic discussion of exploration seismology. The first part of the book looks at the history of exploration seismology and the theory - developed from the first principles of physics. All aspects of seismic acquisition are then described. The second part of the book goes on to discuss data-processing and interpretation. Applications of seismic exploration to groundwater, environmental and reservoir geophysics are also included. The book is designed to give a comprehensive up-to-date picture of the applications of seismology. Exploration Seismology's comprehensiveness makes it suitable as a text for undergraduate courses for geologists, geophysicists and engineers, as well as a guide and reference work for practising professionals.

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

Seismic Velocity Models for Western Alluvial Basins

System Dynamics

Introduction to Petroleum Seismology, second edition

Feedback Systems

An Introduction to Modern Cosmology

This textbook presents the timeless basic physical and mathematical principles and philosophy of environmental modeling to students who need to be taught how to think in a different way than they would for more narrowly-defined engineering or physics problems. Examples come from a range of hydrologic, atmospheric, and geophysical problems.

Sensor data fusion is the process of combining error-prone, heterogeneous, incomplete, and ambiguous data to gather a higher level of situational awareness. In principle, all living creatures are fusing information from their complementary senses to coordinate their actions and to detect and localize danger. In sensor data fusion, this process is transferred to electronic systems, which rely on some "awareness" of what is happening in certain areas of interest. By means of probability theory and statistics, it is possible to model the relationship between the state space and the sensor data. The number of ingredients of the resulting Kalman filter is limited, but its applications are not.

A study was made of the open literature on the geologic structure of the Basin and Range Province of the western United States. Based on this study, an attempt was made to derive a model of a typical basin for use in estimating the seismic ground motion characteristics of alluvial basins in the designated MX deployment area. Among the topics investigated are dimensions and structure of an average basin and characteristic seismic velocities in the basin interiors. In addition, many of the basins are expected to show significant variations from a typical structure and these variations are discussed. (Author).

Accompanying CD-ROM includes PDF slides for teaching the material in the book and the C3-narrow-azimuth classic data set.

with applications to heat transfer, fluid mechanics, and solid mechanics

An Introduction to Stochastic Modeling

A Concise Guide to Geopressure

Imaging and Velocity Analysis by Target-oriented Wavefield Inversion

Introduction to Petroleum Seismology

Seismic measurements take many forms, and appear to have a universal role in the Earth Sciences. They are the means for most easily and economically interpreting what lies beneath the visible surface. There are huge economic rewards and losses to be made when interpreting the shallow crust or subsurface more, or less accurately, as the case may be.

The second edition of An Introduction to Nonlinear Finite Element Analysis offers an easy-to-understand treatment of nonlinear finite element analysis, which includes element development from mathematical models and numerical evaluation of the underlying physics. Additional explanations, examples, and problems have been added to all chapters.

Serving as the foundation for a one-semester course in stochastic processes for students familiar with elementary probability theory and calculus, Introduction to Stochastic Modeling, Fourth Edition, bridges the gap between basic probability and an intermediate level course in stochastic processes. The objectives of the text are to introduce students to the standard concepts and methods of stochastic modeling, to illustrate the rich diversity of applications of stochastic processes in the applied sciences, and to provide exercises in the application of simple stochastic analysis to realistic problems. New to this edition: Realistic applications from a variety of disciplines integrated throughout the text, including more biological applications Plentiful, completely updated problems Completely updated and reorganized end-of-chapter exercise sets, 250 exercises with answers New chapters of stochastic differential equations and Brownian motion and related processes Additional sections on Martingale and Poisson process Realistic applications from a variety of disciplines integrated throughout the text Extensive end of chapter exercises sets, 250 with answers Chapter 1-9 of the new edition are identical to the previous edition New! Chapter 10 - Random Evolutions New! Chapter 11- Characteristic functions and Their Applications

This volume brings together works published since the early 1980s, striking a balance between algorithm development and estimation of subsurface velocity and anisotropy parameters. In that time span, a radical change has occurred in the way seismic processing has delivered a subsurface image. The traditional purely compartmentalized approach has been superseded by a multidisciplinary collaborative workflow to build iteratively a subsurface velocity model suitable for detailed and quantitative imaging. Jones et al. emphasize works that have had the most practical industrial application rather than assessing all approaches equally. Hence, the bias is away from R&D and toward industrial practice. Because of the distribution of papers in this reprint edition, split between migration algorithm and velocity estimation techniques, this volume will appeal to processing specialists and interpretation geoscientists alike.

An Introduction to Nonlinear Finite Element Analysis

Prestack Depth Migration and Velocity Model Building

International Conference, AICI 2010, Sanya, China, October 23-24, 2010, Proceedings, Part II

S-wave Velocity Below Europe from Delay-time and Waveform Inversions

An Introduction To: Velocity Model Building

Öz Yilmaz has expanded his original volume on processing to include inversion and interpretation of seismic data. In addition to the developments in all aspects of conventional processing, this two-volume set represents a comprehensive and complete coverage of the modern trends in the seismic industry-from time to depth, from 3-D to 4-D, from 4-D to 4-C, and from isotropy to anisotropy.

Modelling forms a vital part of all engineering design, yet many hydraulic engineers are not fully aware of the assumptions they make. These assumptions can have important consequences when choosing the best model to inform design decisions. Considering the advantages and limitations of both physical and mathematical methods, this book will help you identify the most appropriate form of analysis for the hydraulic engineering application in question. All models require the knowledge of their background, good data and careful interpretation and so this book also provides guidance on the range of accuracy to be expected of the model simulations and how they should be related to the prototype. Applications to models include: open channel systems closed conduit flows storm drainage systems estuaries coastal and nearshore structures hydraulic structures. This an invaluable guide for students and professionals.

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.

The 2010 International Conference on Artificial Intelligence and Computational Intelligence (AICI 2010) was held October 23-24, 2010 in Sanya, China. The AICI 2010 received 1,216 submissions from 20 countries and regions. After rigorous reviews, 105 high-quality papers were selected for publication in the AICI 2010 proceedings. The acceptance rate was 8%. The aim of AICI 2010 was to bring together researchers working in many different areas of artificial intelligence and computational intelligence to foster the exchange of new ideas and promote international collaborations. In addition to the large number of submitted papers and invited sessions, there were several internationally well-known keynote speakers. On behalf of the Organizing Committee, we thank Hainan Province Institute of Computer and Qiongzhou University for its sponsorship and logistics support. We also thank the members of the Organizing Committee and the Program Committee for their hard work. We are very grateful to the keynote speakers, invited session organizers, session chairs, reviewers, and student helpers. Last but not least, we thank all the authors and participants for their great contributions that made this conference possible.

Volume 1: Imaging

Rock Quality, Seismic Velocity, Attenuation and Anisotropy

The Seismic Velocity Model as an Interpretation Asset

Processing, Inversion, and Interpretation of Seismic Data

An Introduction for Mechanical Engineers

This book sets-out to give the reader a non-mathematical understanding of the basic principles of migration and of building a velocity model of the earth's subsurface. The intended readership includes anyone who has to work with, or to understand, how contemporary seismic images are created: what are the underlying principles and pitfalls? How is a velocity model typically built and what are the consequences of not getting it right? Concepts such as uncertainty and non-uniqueness are discussed as are the ways in which these topics translate to risk-reduction and reliability in the final image. The different ways of representing a velocity model are reviewed as are the techniques used for picking velocity and anisotropy related information. A review of the principles of tomography is presented, to familiarize the reader with the techniques that underpin all contemporary velocity model update. Also, the physics behind anisotropy and its consequences for obtaining images in ?true? geological depth are discussed. An historical overview of velocity model building techniques over the past 30 years is presented to give the reader a feel for how the black art of model building has evolved in tandem with the increase in computer power and the emergence of powerful interactive graphics, covering the evolution from a purely linear compartmentalized industrial process towards a fully interactive multidisciplinary approach to iteratively building a reliable subsurface velocity model. The book concludes with a look at emerging and future trends: the promise of velocity-independent imaging and the potential of full waveform inversion. Bron: Flaptekst, uitgeversinformatie.

Introduction to Petroleum Seismology, second edition (SEG Investigations in Geophysics Series No. 12) provides the theoretical and practical foundation for tackling present and future challenges of petroleum seismology especially those related to seismic survey designs, seismic data acquisition, seismic and EM modeling, seismic imaging, microseismicity, and reservoir characterization and monitoring. All of the chapters from the first edition have been improved and/or expanded. In addition, twelve new chapters have been added. These new chapters expand topics which were only alluded to in the first edition: sparsity representation, sparsity and nonlinear optimization, near-simultaneous multiple-shooting acquisition and processing, nonuniform wavefield sampling, automated modeling, elastic-electromagnetic mathematical equivalences, and microseismicity in the context of hydraulic fracturing. Another major modification in this edition is that each chapter contains analytical problems as well as computational problems. These problems include MatLab codes, which may help readers improve their understanding of and intuition about these materials. The comprehensiveness of this book makes it a suitable text for undergraduate and graduate courses that target geophysicists and engineers as well as a guide and reference work for researchers and professionals in academia and in the petroleum industry.

This book first focuses on the explanation of the theory about focal mechanisms and moment tensor solutions and their role in the modern seismology. The second part of the book compiles several state-of-the-art case studies in different seismotectonic settings of the planet.The assessment of seismic hazard and the reduction of losses due to future earthquakes is probably the most important contribution of seismology to society. In this regard, the understanding of reliable determination seismic source and of its uncertainty can play a key role in contributing to geodynamic investigation, seismic hazard assessment and earthquake studies. In the last two decades, the use of waveforms recorded at local-to-regional distances has increased considerably. Waveform modeling has been used also to estimate faulting parameters of small-to-moderate sized earthquakes.

University Physics is designed for the two- or three-semester calculus-based physics course. The text has been developed to meet the scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science, or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building upon what students have already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize concepts, but to work with them in ways that will be useful in later courses and future careers. The organization and pedagogical features were developed and vetted with feedback from science educators dedicated to the project. VOLUME III Unit 1: Optics Chapter 1: The Nature of Light Chapter 2: Geometric Optics and Image Formation Chapter 3: Interference Chapter 4: Diffraction Unit 2: Modern Physics Chapter 5: Relativity Chapter 6: Photons and Matter Waves Chapter 7: Quantum Mechanics Chapter 8: Atomic Structure Chapter 9: Condensed Matter Physics Chapter 10: Nuclear Physics Chapter 11: Particle Physics and Cosmology

Traffic and Granular Flow ' 01

An Introduction to Numerical Weather Prediction Techniques

An Introduction to Mathematical Modeling

A Useful Tool for Seismotectonics

Seismic Data Analysis

The main purpose of this book is to provide the theoretical background to engineers and scientists engaged in modeling transport phenomena in porous media, in connection with various engineering projects, and to serve as a text for senior and graduate courses on transport phenomena in porous media. Such courses are taught in various disciplines, e. g. , civil engineering, chemical engineering, reservoir engineering, agricultural engineering and soil science. In these disciplines, problems are encountered in which various extensive quantities, e. g. , mass and heat, are transported through a porous material domain. Often the porous material contains several fluid phases, and the various extensive quantities are transported simultaneously throughout the multiphase system. In all these disciplines, management decisions related to a system's development and its operation have to be made. To do so, the 'manager', or the planner, needs a tool that will enable him to forecast the response of the system to the implementation of proposed management schemes. This forecast takes the form of spatial and temporal distributions of variables that describe the future state of the considered system. Pressure, stress, strain, density, velocity, solute concentration, temperature, etc. , for each phase in the system, and sometime for a component of a phase, may serve as examples of state variables. The tool that enables the required predictions is the model. A model may be defined as a simplified version of the real (porous medium) system that approximately simulates the excitation-response relations of the latter.

An approachable and concise introduction to seismology for upper-division undergraduates and first-year graduate students.

This thesis develops a novel target-oriented inversion framework that uses wavefields as carriers of information to image both low-wavenumber component (a.k.a. background velocity) and high-wavenumber component (a.k.a. reflectivity) of the earth model in complex geological settings, such as subsalt regions. I address the problem of reflectivity imaging with target-oriented wavefield least-squares migration, and the problem of velocity estimation with target-oriented wavefield tomography. Reflectivity images of the subsurface are commonly produced by prestack depth migration. When the overburden is complex and the reflectors are unevenly or insufficiently illuminated, the migration operator alone is inadequate to provide an optimal image. I tackle the problem of distorted illumination in reflectivity imaging by wavefield least-squares migration. I formulate least-squares migration in the image domain and solve it in a target-oriented fashion. In the image-domain formulation, explicit computation of the Hessian operator (the resolution function that measures the illumination deficiency of the imaging system) is the most important and challenging step. I develop a novel method based on phase encoding to efficiently and accurately compute the target-oriented Hessian operator. The Hessian operator is then used to recover the reflectivity by iterative inverse filtering. I regularize the inversion with dip constraints, which naturally incorporate interpreted geological information into the inversion. Accurate imaging of the reflectivity also requires an accurate background velocity model. High-quality velocity model-building in complex geology requires wavefield-based velocity analysis to properly model band-limited wave phenomena. However, the high cost and lack of flexibility of target-oriented model-building prevent this method from being widely used in practice. I overcome the cost and flexibility issues of wavefield-based migration velocity analysis by developing target-oriented wavefield tomography. Target-oriented wavefield tomography is achieved by synthesizing a new data set specifically for velocity analysis. The new data set is generated based on an initial unfocused target image and by a novel application of generalized Born wavefield modeling, which correctly preserves velocity kinematics by modeling both zero and non-zero subsurface-offset-domain images. The new data set can be synthesized for a chosen target region with velocity inaccuracies. The reduced data size and computation domain, therefore, greatly improve the efficiency and flexibility of wavefield tomography, allowing fast and interpretation-driven interactive wavefield-based velocity analysis, where different geological scenarios or hypotheses can be tested in quasi-real time. The proposed target-oriented inversion framework successfully estimates subsalt velocities and recovers subsalt reflectivities from distorted illumination from 2-D synthetic and 3-D field data.

The essential introduction to the principles and applications of feedback systems—now fully revised and expanded This textbook covers the mathematics needed to model, analyze, and design feedback systems. Now more user-friendly than ever, this revised and expanded edition of Feedback Systems is a one-volume resource for students and researchers in mathematics and engineering. It has applications across a range of disciplines that utilize feedback in physical, biological, information, and economic systems. Karl Å str ö m and Richard Murray use techniques from physics, computer science, and operations research to introduce control-oriented modeling. They begin with state space tools for analysis and design, including stability of solutions, Lyapunov functions, reachability, state feedback observability, and estimators. The matrix exponential plays a central role in the analysis of linear control systems, allowing a concise development of many of the key concepts for this class of models. Å str ö m and Murray then develop and explain tools in the frequency domain, including transfer functions, Nyquist analysis, PID control, frequency domain design, and robustness. Features a new chapter on design principles and tools, illustrating the types of problems that can be solved using feedback Includes a new chapter on fundamental limits and new material on the Routh-Hurwitz criterion and root locus plots Provides exercises at the end of every chapter Comes with an electronic solutions manual An ideal textbook for undergraduate and graduate students Indispensable for researchers seeking a self-contained resource on control theory

Introduction to Seismology

Handbook of Borehole Acoustics and Rock Physics for Reservoir Characterization

Migration-Velocity Analysis using Image-Space Generalized Wavefields

Hydraulic Modelling: An Introduction

Exploration Seismology

An overview of the processes related to geopressure development, prediction and detection using state-of-the-art tools and technologies.

A concise guide to the origins and prediction of subsurface fluid pressures, emphasizing the interactions with geological processes.

The second edition of An Introduction to Nonlinear Finite Element Analysis has the same objective as the first edition, namely, to facilitate an easy and thorough understanding of the details that are involved in the theoretical formulation, finite element model development, and solutions of nonlinear problems. The book offers an easy-to-understand treatment of the subject of nonlinear finite element analysis, which includes element development from mathematical models and numerical evaluation of the underlying physics. The new edition is extensively reorganized and contains substantial amounts of new material. Chapter 1 in the second edition contains a section on applied functional analysis. Chapter 2 on nonlinear continuum mechanics is entirely new. Chapters 3 through 8 in the new edition correspond to Chapter 2 through 8 of the first edition, but with additional explanations, examples, and exercise problems. Material on time dependent problems from Chapter 8 of the first edition is absorbed into Chapters 4 through 8 of the new edition. Chapter 9 is extensively revised and it contains up to date developments in the large deformation analysis of isotropic, composite and functionally graded shells. Chapter 10 of the first edition on material nonlinearity and coupled problems is reorganized in the second edition by moving the material on solid mechanics to Chapter 12 in the new edition and material on coupled problems to the new chapter, Chapter 10, on weak-form Galerkin finite element models of viscous incompressible fluids. Finally, Chapter 11 in the second edition is entirely new and devoted to least-squares finite element models of viscous incompressible fluids. Chapter 12 of the second edition is enlarged to contain finite element models of viscoelastic beams. In general, all of the chapters of the second edition contain additional explanations, detailed example problems, and additional exercise problems. Although all of the programming segments are in Fortran, the logic used in these Fortran programs is transparent and can be used in Matlab or C++ versions of the same. Thus the new edition more than replaces the first edition, and it is hoped that it is acquired by the library of every institution of higher learning as well as serious finite element analysts. The book may be used as a textbook for an advanced course (after a first course) on the finite element method or the first course on nonlinear finite element analysis. A solutions manual is available on request from the publisher to instructors who adopt the book as a textbook for a course.

A velocity model can have enduring and growing interpretive value, beyond its initial creation to optimize the seismic image. The 3D velocity model is often built carefully with a combination of geophysical and geologic input because of the accuracy demands placed on it by the requirements of depth imaging. As such, this model becomes an increasingly effective interpretive tool. This book, first published for use with the SEG/EAGE second Distinguished Instructor Short Course, addresses the ways in which the interpreter should participate in the development of the velocity model and underscores the velocity model's interpretive value with numerous case study examples. This volume will prove invaluable to interpreters excited about the prospect of participating actively in the velocity model-building process and who wish to pursue aggressively the additional advantages offered by using the velocity model during interpretation.

Introduction and Implementations of the Kalman Filter

Introduction to Modeling of Transport Phenomena in Porous Media

Moment Tensor Solutions

With Applications to Heat Transfer, Fluid Mechanics, and Solid Mechanics

Illustrated Seismic Processing

Accessible text features over 100 reality-based examples pulled from the science, engineering, and operations research fields. Prerequisites: ordinary differential equations, continuous probability. Numerous references. Includes 27 black-and-white figures. 1978 edition.

Here is a basic introduction to Lattice Boltzmann models that emphasizes intuition and simplistic conceptualization of processes, while avoiding the complex mathematics that underlies LB models. The model is viewed from a particle perspective where collisions, streaming, and particle-particle/particle-surface interactions constitute the entire conceptual framework. Beginners and those whose interest is in model application over detailed mathematics will find this a powerful 'quick start' guide. Example simulations, exercises, and computer codes are included.

This unique textbook takes the student from the initial steps in modeling a dynamic system through development of the mathematical models needed for feedback control. The generously-illustrated, student-friendly text focuses on fundamental theoretical development rather than the application of commercial software. Practical details of machine design are included to motivate the non-mathematically inclined student.

According to platonists, entities such as numbers, sets, propositions and properties are abstract objects. But abstract objects lack causal powers and a location in space and time, so how could we ever come to know of the existence of such impotent and remote objects? In Knowledge, Cause, and Abstract Objects, Colin Cheyne presents the first systematic and detailed account of this epistemological objection to the platonist doctrine that abstract objects exist and can be known. Since mathematics has such a central role in the acquisition of scientific knowledge, he concentrates on mathematical platonism. He also concentrates on our knowledge of what exists, and argues for a causal constraint on such existential knowledge. Finally, he exposes the weaknesses of recent attempts by platonists to account for our supposed platonic knowledge. This book will be of particular interest to researchers and advanced students of epistemology and of the philosophy of mathematics and science. It will also be of interest to all philosophers with a general interest in metaphysics and ontology.

An Introduction to Velocity Model Building

University Physics

Principles, Methods and Applications

3D Seismic Imaging

Artificial Intelligence and Computational Intelligence

An Introduction to Modern Cosmology Third Edition is an accessible account of modern cosmological ideas. The Big Bang Cosmology is explored, looking at its observational successes in explaining the expansion of the Universe, the existence and properties of the cosmic microwave background, and the origin of light elements in the universe. Properties of the very early Universe are also covered, including the motivation for a rapid period of expansion known as cosmological inflation. The third edition brings this established undergraduate textbook up-to-date with the rapidly evolving observational situation. This fully revised edition of a bestseller takes an approach which is grounded in physics with a logical flow of chapters leading the reader from basic ideas of the expansion described by the Friedman equations to some of the more advanced ideas about the early universe. It also incorporates up-to-date results from the Planck mission, which imaged the anisotropies of the Cosmic Microwave Background radiation over the whole sky. The Advanced Topic sections present subjects with more detailed mathematical approaches to give greater depth to discussions. Student problems with hints for solving them and numerical answers are embedded in the chapters to facilitate the reader's understanding and learning. Cosmology is now part of the core in many degree programs. This current, clear and concise introductory text is relevant to a wide range of astronomy programs worldwide and is essential reading for undergraduates and Masters students, as well as anyone starting research in cosmology. The accompanying website for this text, http://booksupport.wiley.com, provides additional material designed to enhance your learning, as well as errata within the text.

This third edition provides a concise yet approachable introduction to seismic theory, designed as a first course for graduate students or advanced undergraduate students. It clearly explains the fundamental concepts, emphasizing intuitive understanding over lengthy derivations, and outlines the different types of seismic waves and how they can be used to resolve Earth structure and understand earthquakes. New material and updates have been added throughout, including ambient noise methods, shear-wave splitting, back-projection, migration and velocity analysis in reflection seismology, earthquake rupture directivity, and fault weakening mechanisms. A wealth of both reworked and new examples, review questions and computer-based exercises in MATLAB®/Python give students the opportunity to apply the techniques they have learned to compute results of interest and to illustrate Earth's seismic properties. More advanced sections, which are not needed to understand the other material, are flagged so that instructors or students pressed for time can skip them.

Modelling with Mathematics

Lattice Boltzmann Modeling

Introduction to Environmental Modeling

Modelling, Simulation and Control of Urban Wastewater Systems

An Introduction for Geoscientists and Engineers