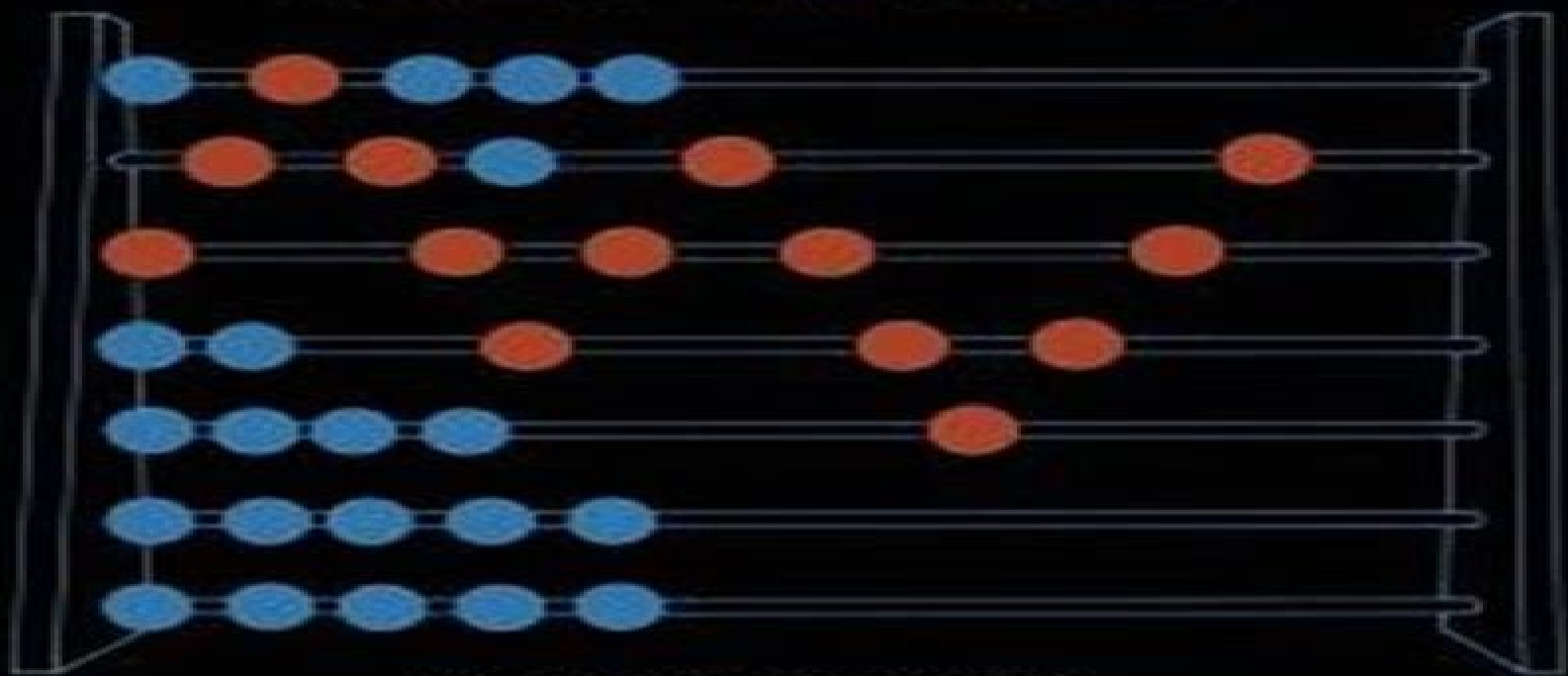


A.R. CAMINA AND G.J. JANACEK

MATHEMATICS FOR SEISMIC DATA PROCESSING AND INTERPRETATION



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Mathematics For Seismic Data

**N.J. Vlaar, G. Nolet, M.J.R.
Wortel, S.A.P.L. Cloetingh**



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Mathematics for Seismic Data Processing and Interpretation A.R. Camina, J. Janacek, 2012-12-06 With the growth of modern computing power it has become possible to apply far more mathematics to real problems This has led to the difficulty that many people who have been working in various jobs suddenly find themselves not understanding the modern processing which is being applied to their own professional field It also means that the people presently being trained in these subjects need to understand a much wider range of mathematics than in the past It is to both of these groups that this book is addressed The major objective is to present the reader with the basic mathematical understanding to follow the new developments in their own field The mathematics in this book is based on the need to understand signal processing The modern work in this area is mathematically very sophisticated and our purpose is not to train professional mathematicians but to make far more of the literature accessible Since this book is based on courses devised for Racial Geophysics there is clearly going to be a bias towards the applications in that area as the title implies It is also true that the bibliography has been chosen in order to aid the reader in that field by pointing them in the direction of recent applications in geophysics

Mathematics of Multidimensional Seismic Imaging, Migration, and Inversion N. Bleistein, J.K. Cohen, John W. Jr. Stockwell, 2013-11-22 In the last 40 years geophysicists have found that it is possible to construct images and even determine important physical characteristics of rocks that can yield information about oil and gas bearing structures in the earth To make these images and extract this information requires the application of an advanced understanding of the mathematical physics of wave propagation The oil and gas industry labels a major collection of the necessary seismic data processing methods by the name seismic migration This text is the first to treat many kinds of migration in a unified mathematical way The audience is mathematically oriented geophysicists or applied mathematicians working in the field of inverse scattering imaging The text can serve as a bridge between the applied math and geophysics community by presenting geophysicists with a practical introduction to advanced engineering mathematics while presenting mathematicians with a window into the world of the mathematically sophisticated geophysicist

Mathematical Methods and Modelling in Hydrocarbon Exploration and Production Armin Iske, Trygve Randen, 2006-01-27 Hydrocarbon exploration and production incorporate great technology challenges for the oil and gas industry In order to meet the world's future demand for oil and gas further technological advance is needed which in turn requires research across multiple disciplines including mathematics geophysics geology petroleum engineering signal processing and computer science This book addresses important aspects and fundamental concepts in hydrocarbon exploration and production Moreover new developments and recent advances in the relevant research areas are discussed whereby special emphasis is placed on mathematical methods and modelling The book reflects the multi disciplinary character of the hydrocarbon production workflow ranging from seismic data imaging seismic analysis and interpretation and geological model building to numerical reservoir simulation Various challenges

concerning the production workflow are discussed in detail The thirteen chapters of this joint work authored by international experts from academic and industrial institutions include survey papers of expository character as well as original research articles Large parts of the material presented in this book were developed between November 2000 and April 2004 through the European research and training network NetAGES Network for Automated Geometry Extraction from Seismic The new methods described here are currently being implemented as software tools at Schlumberger Stavanger Research one of the world's largest service providers to the oil industry

Lecture Notes on the Basic Mathematics of Digital Processing of Seismic Data Eric Pickles, 1967

Dictionary of Mathematical Geosciences Richard J. Howarth, 2017-05-27 This dictionary includes a number of mathematical statistical and computing terms and their definitions to assist geoscientists and provide guidance on the methods and terminology encountered in the literature Each technical term used in the explanations can be found in the dictionary which also includes explanations of basics such as trigonometric functions and logarithms There are also citations from the relevant literature to show the term's first use in mathematics statistics etc and its subsequent usage in geosciences

Mathematics of Information and Coding Te Sun Han, Kingo Kobayashi, 2002 This book is intended to provide engineering and or statistics students communications engineers and mathematicians with the firm theoretic basis of source coding or data compression in information theory Although information theory consists of two main areas source coding and channel coding the authors choose here to focus only on source coding The reason is that in a sense it is more basic than channel coding and also because of recent achievements in source coding and compression An important feature of the book is that whenever possible the authors describe universal coding methods i.e the methods that can be used without prior knowledge of the statistical properties of the data The authors approach the subject of source coding from the very basics to the top frontiers in an intuitively transparent but mathematically sound manner The book serves as a theoretical reference for communication professionals and statisticians specializing in information theory It will also serve as an excellent introductory text for advanced level and graduate students taking elementary or advanced courses in telecommunications electrical engineering statistics mathematics and computer science

Mathematics of Planet Earth Eulogio Pardo-Igúzquiza, Carolina Guardiola-Albert, Javier Heredia, Luis Moreno-Merino, Juan José Durán, Jose Antonio Vargas-Guzmán, 2013-10-07 It is widely recognized that the degree of development of a science is given by the transition from a mainly descriptive stage to a more quantitative stage In this transition qualitative interpretations conceptual models are complemented with quantification numerical models both deterministic and stochastic This has been the main task of mathematical geoscientists during the last forty years to establish new frontiers and new challenges in the study and understanding of the natural world Mathematics of Planet Earth comprises the proceedings of the International Association for Mathematical Geosciences Conference IAMG2013 held in Madrid from September 2-6 2013 The Conference addresses researchers professionals and students The proceedings contain more than 150 original contributions and give a

multidisciplinary vision of mathematical geosciences

Coding and Decoding: Seismic Data Luc T. Ikelle, 2010-03-29

Currently the acquisition of seismic surveys is performed as a sequential operation in which shots are computed separately one after the other. This approach is similar to that of multiple access technology which is widely used in cellular communications to allow several subscribers to share the same telephone line. The cost of performing various shots simultaneously is almost identical to that of one shot, thus the savings in time and money expected from using the multishooting approach for computing seismic surveys compared to the current approach are enormous. By using this approach the long standing problem of simulating a three dimensional seismic survey can be reduced to a matter of weeks and not years as is currently the case. Investigates how to collect stimulate and process multishooting data. Addresses the improvements in seismic characterization and resolution one can expect from multishooting data. Aims to educate the oil and gas exploration and production business of the benefits of multishooting data and to influence their day to day surveying techniques.

Practical Seismic Data Analysis

Hua-Wei Zhou, 2014-01-23

Modern introduction to seismic data processing demonstrating exploration and global geophysics applications through real data and tutorial examples that can be demonstrated with the instructor's software of choice. The underlying physics and mathematics of analysis methods is presented showing students the limitations and potential for creating models of the sub surface.

Coding and Decoding: Seismic Data Luc T. Ikelle, 2017-12-07

Coding and Decoding Seismic Data The Concept of Multishooting Volume One Second Edition offers a thorough investigation of modern techniques for collecting simulating and processing multishooting data. Currently the acquisition of seismic surveys is performed as a sequential operation in which shots are computed separately one after the other. The cost of performing various shots simultaneously is almost identical to that of one shot, thus the benefits of using the multishooting approach for computing seismic surveys are enormous. By using this approach the longstanding problem of simulating a three dimensional seismic survey can be reduced to a matter of weeks. Providing both theoretical and practical explanations of the multishooting approach including case histories, this book is an essential resource for exploration geophysicists and practicing seismologists. Investigates how to collect stimulate and process multishooting data. Addresses the improvements in seismic characterization and resolution that can be expected from multishooting data. Provides information for the oil and gas exploration and production business that will influence day to day surveying techniques. Covers robust decoding methods of undetermined mixtures, nonlinear decoding, the use of constraints in decoding processes and nonlinear imaging of undecoded data. Includes access to a companion site with answers to questions posed in the book.

Handbook of Exploration Geophysics Paul A. Chapel, 1992-01-01

Geophysics the excellent exploration tool which traditionally uses the latest techniques has been in great demand and has assisted by remarkable development of the methods which consist of gravimetry, electromagnetics and the most important seismic reflection. The book is presented like an encyclopedia. One may find an exact definition illustrated with simple sketches, precise formulae

orders of magnitude data which have so often been missing

Exploration Geophysics Mamdouh R. Gadallah, Ray Fisher, 2008-11-04 Many text books have been written on the subject Exploration Geophysics The majority of these texts focus on the theory and the mathematical treatment of the subject matter but lack treatment of practical aspects of geophysical exploration This text is written in simple English to explain the physical meaning of jargon or terms used in the industry It describes how seismic data is acquired in 2 D and 3 D how they are processed to convert the raw data to seismic vertical and horizontal cross sections that are geologically meaningful and how these and other data are interpreted to delineate a prospect Workshops are included after each chapter and are designed to reinforce learning of the concepts presented Key Features Written in simple easy to understand language Heavily illustrated to aid in understanding the text End of chapter Key words and workshop The text includes several appendices and answers for the selected workshop problems

Mathematical Geophysics N.J. Vlaar, G. Nolet, M.J.R. Wortel, S.A.P.L. Cloetingh, 2012-12-06 The contributions to this book follow a topical trend In several geophysical fields evidence is accumulating concerning the deviation of the earth's structure from radial symmetry Seismology provides the most adequate resolution for revealing the earth's lateral inhomogeneity on a global to local scale Lateral structure in the density distribution is also manifest in the earth's gravity field and in the geoid Asphericity in physical parameters generally supposed only to vary with the vertical coordinate has a profound influence on geodynamics The effects of these deviations from spherical symmetry concern in particular convection theory post glacial rebound and the dynamics of the lithosphere and upper mantle in general At the 16th International Conference on Mathematical Geophysics which was held in Oosterbeek the Netherlands in 1986 the need was felt to present the state of the art Several prospective authors were found interested to contribute to the present book This Oosterbeek conference was one in a long series of topical conferences starting with the Upper Mantle Project Symposia on Geophysical Theory and Computers in the 1960s and thence their successors the conferences on Mathematical Geophysics until the present

Statistical Methods Of Geophysical Data Processing Vladimir Troyan, Yurii Kiselev, 2010-02-10 This textbook contains a consideration of the wide field of problems connected with statistical methods of processing of observed data with the main examples and considered models related to geophysics and seismic exploration This textbook will be particularly helpful to students and professionals from various fields of physics connected with an estimation of the parameters of the physical objects by experimental data The reader can also find many important topics which are the basis for statistical methods of estimation and inverse problem solutions

ICIAM 91 Robert E. O'Malley, 1992-01-01 Proceedings Computer Arithmetic Algebra OOP

Exploration Seismology R. E. Sheriff, L. P. Geldart, 1995-08-25 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

Mathematical Models and Methods for Real World Systems K.M. Furati, Abul Hasan Siddiqi, 2005-07-19 This volume centers on the links between mathematics and the physical world It first explores future challenges of mathematical technology offers a wide ranging definition of industrial mathematics and explains the mathematics of type II superconductors After lucid discussions on theoretical and applied aspects of wavelets the book presents classical and fractal methods for physical problems including a fractal approach to porous media textures and using MATLAB to model chaos in the motion of a satellite The final section surveys recent trends in variational methods focusing on areas such as elliptic inverse problems sweeping processes and the BBKY hierarchy of quantum kinetic equations

Frontiers Of Remote Sensing Information Processing Chi Hau Chen, 2003-07-07 Written by leaders in the field of remote sensing information processing this book covers the frontiers of remote sensors especially with effective algorithms for signal image processing and pattern recognition with remote sensing data Sensor and data fusion issues SAR images hyperspectral images and related special topics are also examined Techniques making use of neural networks wavelet transforms and knowledge based systems are emphasized A special set of three chapters is devoted to seismic analysis and discrimination In summary the book provides an authoritative treatment of major topics in remote sensing information processing and defines new frontiers for these areas

Issues in Logic, Operations, and Computational Mathematics and Geometry: 2013 Edition, 2013-05-01 Issues in Logic Operations and Computational Mathematics and Geometry 2013 Edition is a ScholarlyEditions book that delivers timely authoritative and comprehensive information about Random Structures and Algorithms The editors have built Issues in Logic Operations and Computational Mathematics and Geometry 2013 Edition on the vast information databases of ScholarlyNews You can expect the information about Random Structures and Algorithms in this book to be deeper than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Issues in Logic Operations and Computational Mathematics and Geometry 2013 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source you can cite with authority confidence and credibility More information is available at <http://www.ScholarlyEditions.com>

Technical Abstract Bulletin, 1981

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