A.R. CAMINA AND G.J. JANACEK

MATHEMATICS
FOR
SEISMIC DATA
PROCESSING
AND
INTERPRETATION
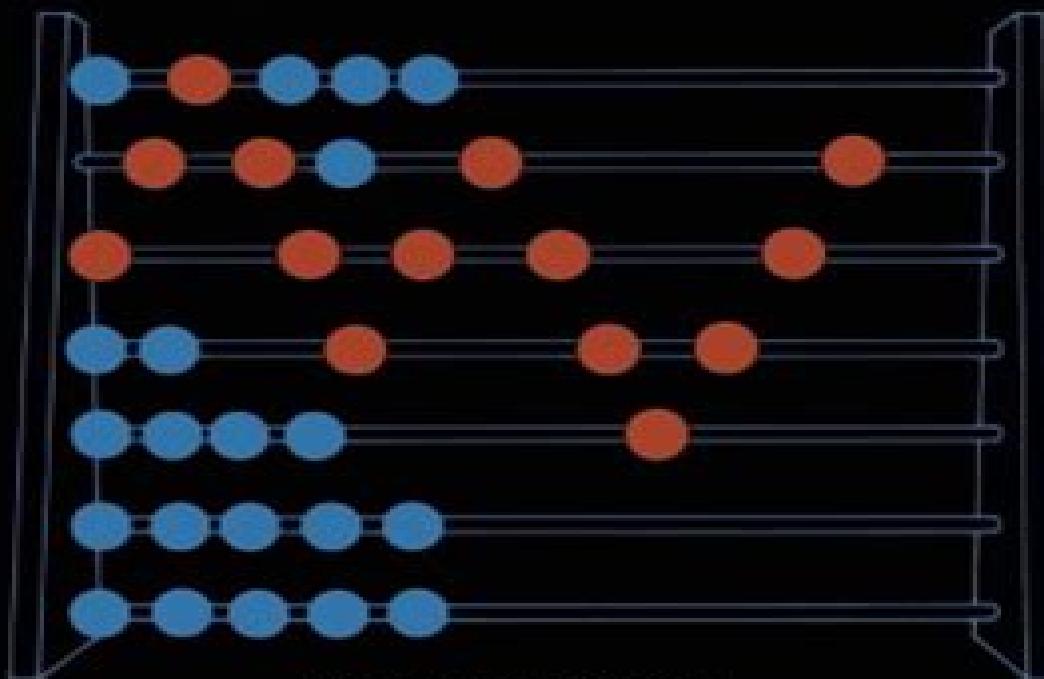
Mathematics For Seismic Data Processing And Interpretation

SJ Ball

Mathematics For Seismic Data Processing And Interpretation:

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 mathe matics 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 process ing 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 Racal 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 bibliogra phy has been chosen in order to aid the reader in that field by pointing them in the direction of recent applications in geophysics

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   **Meta-attributes and Artificial Networking** Kalachand Sain,Priyadarshi Chinmoy Kumar,2022-06-24 Applying machine learning to the interpretation of seismic data Seismic data gathered on the surface can be used to generate numerous seismic attributes that enable better understanding of subsurface geological structures and stratigraphic features With an ever increasing volume of seismic data available machine learning augments faster data processing and interpretation of complex subsurface geology Meta Attributes and Artificial Networking A New Tool for Seismic Interpretation explores how artificial neural networks can be used for the automatic interpretation of 2D and 3D seismic data Volume highlights include Historic evolution of seismic attributes Overview of meta attributes and how to design them Workflows for the computation of meta attributes from seismic data Case studies demonstrating the application of meta attributes Sets of exercises with solutions provided Sample data sets available for hands on exercises The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity Its publications disseminate scientific knowledge and provide resources for researchers students and professionals   **Introduction to Petroleum Seismology, second edition** Luc T. Ikelle ,Lasse Amundsen,2018-03-26 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   **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   Computer Applications in the Mineral Industries Heping Xie,2020-12-17 This text covers the use of computer applications in the mineral industries encompassing topics such as the use of computer visualization in mining systems and aspects such as ventilation and safety   Tensor Computation for Seismic Data Processing Feng Qian,Shengli Pan,Gulan Zhang,2025-04-26 This book aims to provide a comprehensive understanding of tensor computation and its applications in seismic data analysis exclusively catering to seasoned researchers graduate students and industrial engineers alike Tensor emerges as a natural representation of multi dimensional modern seismic data and tensor computation can help prevent possible harm to the multi dimensional geological structure of the subsurface that occurred in classical seismic data analysis It delivers a wealth of theoretical computational technical and experimental details presenting an engineer s perspective on tensor computation and an extensive investigation of tensor based seismic data analysis techniques Embark on a transformative exploration of seismic data processing unlock the potential of tensor computation and reshape your approach to high dimensional geological structures The discussion begins with foundational chapters providing a solid background in both seismic data processing and tensor

computation The heart of the book lies in its seven chapters on tensor based seismic data analysis methods From structured low tubal rank tensor completion to cutting edge techniques like tensor deep learning and tensor convolutional neural networks each method is meticulously detailed The superiority of tensor based data analysis methods over traditional matrix based data analysis approaches is substantiated through synthetic and real field examples showcasing their prowess in handling high dimensional modern seismic data Notable chapters delve into seismic noise suppression seismic data interpolation and seismic data super resolution using advanced tensor models The final chapter provides a cohesive summary of the conclusion and future research directions ensuring readers facilitate a thorough understanding of tensor computation applications in seismic data processing The appendix includes a hatful of information on existing tensor computation software enhancing the book s practical utility   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   **Studii si cercetari de geologie, geofizica, geografie. Geofizica** Academia Republicii Socialiste România,1987   *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

The Journal of Canadian Petroleum Technology ,1986   **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   *Magnetism, Planetary Rotation, and Convection in the Solar System* W. O'Reilly,1984   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   **The Leading Edge** ,2002-05   **Classic references for earth-science reading** Léon Delbos,Jacobus Gravesteijn,Patrice Lannez,1997   Petroleum Abstracts ,1969   **Seismic Data Analysis** Özdoğan Yilmaz,Stephen M. Doherty,2001 z 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 3D to 4D from 4D to 4C and from isotropy to anisotropy   Bibliography and Index of Geology ,1990   Petroleum Abstracts. Literature and Patents ,1989

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