



# Seismic While Drilling

**Qilong Xue**



## Seismic While Drilling:

*Seismic While Drilling* F.B Poletto, F. Miranda, 2022-08-13 *Seismic While Drilling Fundamentals of Drill Bit Seismic for Exploration* 2nd edition revised and extended gives a theoretical and practical introduction to seismic while drilling by using drill bit noise While drilling seismic methods using surface sources and downhole receivers are also analysed The goal is to support the exploration geology with geophysical control of drilling and to build a bridge between geophysicists involved in seismic while drilling drillers and exploration geologists This revised and extended edition includes new topics such as novel drilling technology downhole communication ground force drill bit measurement SWD seismic interferometry and fiber optic DAS A new section is dedicated to well placement and geosteering Like the first edition *Seismic While Drilling* 2nd edition also includes examples of SWD analysis and application on real data Addresses fundamental knowledge on geophysical principles related to acoustics and seismic waves as well as basic borehole waves and drilling Includes new technological and methodological developments since the publication of the first edition Provides new examples for applications in geothermal and analysis of diffractions offshore marine and tunnel seismic while drilling TSWD

*Seismic While Drilling* F.B Poletto, F. Miranda, 2004-06-30 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

**Advanced Seismic While Drilling System**, 2008 A breakthrough has been discovered for controlling seismic sources to generate selectable low frequencies Conventional seismic sources including sparkers rotary mechanical hydraulic air guns and explosives by their very nature produce high frequencies This is counter to the need for long signal transmission through rock The patent pending SeismicPULSER trademark methodology has been developed for controlling otherwise high frequency seismic sources to generate selectable low frequency peak spectra applicable to many seismic applications Specifically we have demonstrated the application of a low frequency sparker source which can be incorporated into a drill bit for Drill Bit Seismic While Drilling SWD To create the methodology of a controllable low frequency sparker seismic source it was necessary to learn how to maximize sparker

efficiencies to couple to and transmit through rock with the study of sparker designs and mechanisms for a coupling the sparker generated gas bubble expansion and contraction to the rock b the effects of fluid properties and dynamics c linear and non linear acoustics and d imparted force directionality After extensive seismic modeling the design of high efficiency sparkers laboratory high frequency sparker testing and field tests were performed at the University of Texas Devine seismic test site The conclusion of the field test was that extremely high power levels would be required to have the range required for deep 15 000 ft high temperature high pressure HTHP wells Thereafter more modeling and laboratory testing led to the discovery of a method to control a sparker that could generate low frequencies required for deep wells The low frequency sparker was successfully tested at the Department of Energy Rocky Mountain Oilfield Test Center DOE RMOTC field test site in Casper Wyoming An 8 in diameter by 26 ft long SeismicPULSER trademark drill string tool was designed and manufactured by TII An APS Turbine Alternator powered the SeismicPULSER trademark to produce two Hz frequency peak signals repeated every 20 seconds Since the ION Geophysical Inc ION seismic survey surface recording system was designed to detect a minimum downhole signal of three Hz successful performance was confirmed with a 5 3 Hz recording with the pumps running The two Hz signal generated by the sparker was modulated with the 3 3 Hz signal produced by the mud pumps to create an intense 5 3 Hz peak frequency signal The low frequency sparker source is ultimately capable of generating selectable peak frequencies of 1 to 40 Hz with high frequency spectra content to 10 kHz The lower frequencies and perhaps low frequency sweeps are needed to achieve sufficient range and resolution for realtime imaging in deep 15 000 ft high temperature 150 C wells for a geosteering b accurate seismic hole depth c accurate pore pressure determinations ahead of the bit d near wellbore diagnostics with a downhole receiver and wired drill pipe and e reservoir model verification Furthermore the pressure of the sparker bubble will disintegrate rock resulting in an increased overall rates of penetration Other applications for the SeismicPULSER trademark technology are to deploy a low frequency source for greater range on a wireline for Reverse Vertical Seismic Profiling RVSP and Cross Well Tomography Commercialization of the technology is being undertaken by first contacting stakeholders to define the value proposition for rig site services utilizing SeismicPULSER trademark technologies Stakeholders include national oil companies independent oil companies independents service companies and commercial investors Service companies will introduce a new Drill Bit SWD service for deep HTHP wells Collaboration will be encouraged between stakeholders in the form of joint industry projects to develop prototype tools and initial field trials No barriers have been identified for developing utilizing and exploiting the low frequency SeismicPULSER trademark source in a variety of applications Risks will be minimized since Drill Bit SWD will not interfere with the drilling operation and can be performed in a relatively quiet environment when the pumps are turned off The new source must be integrated with other Measurement While Drilling MWD tools To date each of the oil companies and service companies contacted have shown interest in participating in the commercialization of the low frequency

SeismicPULSER trademark source A technical paper has been accepted for presentation at the 2009 Offshore Technology Conference OTC in a Society of Exploration Geologists American Association of Petroleum Geophysicists SEG AAPG technical session **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 *Data Analytics for Drilling Engineering* Qilong Xue,2019-12-30 This book presents the signal processing and data mining challenges encountered in drilling engineering and describes the methods used to overcome them In drilling engineering many signal processing technologies are required to solve practical problems such as downhole information transmission spatial attitude of drillstring drillstring dynamics seismic activity while drilling among others This title attempts to bridge the gap between the signal processing and data mining and oil and gas drilling engineering communities There is an urgent need to summarize signal processing and data mining issues in drilling engineering so that practitioners in these fields can understand each other in order to enhance oil and gas drilling functions In summary this book shows the importance of signal processing and data mining to researchers and professional drilling engineers and open up a new area of application for signal processing and data mining scientists **Soft**

**Computing for Reservoir Characterization and Modeling** Patrick Wong,Fred Aminzadeh,Masoud Nikraves,2001-12-04 In the middle of the 20th century Genrich Altshuller a Russian engineer analysed hundreds of thousands of patents and scientific publications From this analysis he developed TRIZ G Altshuller 40 Principles TRIZ Keys to Technical Innovation TRIZ Tools Volume 1 First Edition Technical Innovation Center Inc Worcester MA January 1998 Y Salamatov TRIZ The Right Solution at the Right Time A Guide to Innovative Problem Solving Insytec B V 1999 the theory of inventive problem solving together with a series of practical tools for helping engineers solving technical problems Among these tools and theories the substance field theory gives a structured way of representing problems the patterns of evolution show the lifecycle of

technical systems the contradiction matrix tells you how to resolve technical contradictions using the forty principles that describe common ways of improving technical systems For example if you want to increase the strength of a device without adding too much extra weight to it the contradiction matrix tells you that you can use Principle 1 Segmentation or Principle 8 Counterweight or Principle 15 Dynamicity or Principle 40 Composite Materials I really like two particular ones Principle 1 Segmentation and Principle 15 Dynamicity Segmentation shows how systems evolve from an initial monolithic form into a set of independent parts then eventually increasing the number of parts until each part becomes small enough that it cannot be identified anymore

**Seismic-while-drilling on ODP Holes 1107 and 1105A** James Rector,Zhuping Liu,Woods Hole Oceanographic Institution,University of California, Berkeley. Department of Materials Science and Mineral Engineering,2001

**Quantitative Analysis of Geopressure for Geoscientists and Engineers** Nader C. Dutta,Ran Bachrach,Tapan Mukerji,2021-03-11 Geopressure or pore pressure in subsurface rock formations impacts hydrocarbon resource estimation drilling and drilling safety in operations This book provides a comprehensive overview of geopressure analysis bringing together rock physics seismic technology quantitative basin modeling and geomechanics It provides a fundamental physical and geological basis for understanding geopressure by explaining the coupled mechanical and thermal processes It also brings together state of the art tools and technologies for analysis and detection of geopressure along with the associated uncertainty Prediction and detection of shallow geohazards and gas hydrates is also discussed and field examples are used to illustrate how models can be practically applied With supplementary MATLAB codes and exercises available online this is an ideal resource for students researchers and industry professionals in geoscience and petroleum engineering looking to understand and analyse subsurface formation pressure

**Handbook of Borehole Acoustics and Rock Physics for Reservoir Characterization** Vimal Saxena,Michel Krief,Ludmila Adam,2018-04-28 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

*Elements of Petroleum Geology* Richard C. Selley, Stephen A. Sonnenberg, 2022-06-11 *Elements of Petroleum Geology* Fourth Edition is a useful primer for geophysicists geologists and petroleum engineers in the oil industry who wish to expand their knowledge beyond their specialized area It is also an excellent introductory text for a university course in petroleum geoscience This updated edition includes new case studies on non conventional exploration including tight oil and shale gas exploration as well as coverage of the impacts on petroleum geology on the environment Sections on shale reservoirs flow units and containers IOR and EOR giant petroleum provinces halo reservoirs and resource estimation methods are also expanded Written by a preeminent petroleum geologist and sedimentologist with decades of petroleum exploration in remote corners of the world Covers information pertinent to everyone working in the oil and gas industry especially geophysicists geologists and petroleum reservoir engineers Fully revised with updated references and expanded coverage of topics and new case studies

**Noise Control, Reduction and Cancellation Solutions in Engineering** Daniela Siano, 2012-03-02 Noise has various effects on comfort performance and human health For this reason noise control plays an increasingly central role in the development of modern industrial and engineering applications Nowadays the noise control problem excites and attracts the attention of a great number of scientists in different disciplines Indeed noise control has a wide variety of applications in manufacturing industrial operations and consumer products The main purpose of this book organized in 13 chapters is to present a comprehensive overview of recent advances in noise control and its applications in different research fields The authors provide a range of practical applications of current and past noise control strategies in different real engineering problems It is well addressed to researchers and engineers who have specific knowledge in acoustic problems I would like to thank all the authors who accepted my invitation and agreed to share their work and experiences

**Well Logging Handbook** Oberto Serra, 2008 Following the success of the Drilling Data Handbook Editions Technip has designed this book to cover the well logging principles and its applications This well logging handbook first edition starts with a summary on geology and petrophysics focusing mainly on its applications The wide range of logging measurements and applications is covered through eleven sections each of them organized into four chapters All in all this is a strongly bound user friendly book with useful information for those involved in all aspects and applications of well logging The paging is notched and externally labelled alphabetically to allow a quick access

**Proceedings of the International Field Exploration and Development Conference 2022** Jia'en Lin, 2023-08-05 This book focuses on reservoir surveillance and management reservoir evaluation and dynamic description reservoir production stimulation and EOR ultra tight reservoir unconventional oil and gas resources technology oil and gas well production testing and geomechanics This book is a compilation of selected papers from the 12th International Field Exploration and Development Conference IFEDC 2022 The conference not only provides a platform to exchanges experience but also promotes the development of scientific research in

oil gas exploration and production The main audience for the work includes reservoir engineer geological engineer enterprise managers senior engineers as well as professional students

**Tomography of the Earth's Crust: From Geophysical Sounding to Real-Time Monitoring** Michael Weber,Ute Münch,2014-02-17 The research work on the topic of Tomography of the Earth s Crust From Geophysical Sounding to Real Time Monitoring has focused on the development of cross scale multiparameter methods and their technological application together with the development of innovative field techniques Seismic wave field inversion theory diffusion and potential methods were developed and optimized with respect to cost and benefit aspects This volume summarizes the scientific results of nine interdisciplinary joint projects funded by the German Federal Ministry of Education and Research in the framework of the Research and Development Program GEOTECHNOLOGIEN Highlights and innovations presented cover many length scales and involve targets ranging from applications in the laboratory to ground water surveys of heterogeneous aquifer geotechnical applications like tunnel excavation coal mine and CO2 monitoring and the imaging and monitoring of tectonic and societally relevant objects as active faults and volcanoes To study these objects the authors use the full spectrum of geophysical methods ultrasonics seismic and seismology electromagnetics gravity and airborne in combination with new methods like seismic interferometry diffuse wave field theory and full wave form inversion in 3D and partially also in 4D Geophysical Sounding to Real Time Monitoring has focused on the development of cross scale multiparameter methods and their technological application together with the development of innovative field techniques Seismic wave field inversion theory diffusion and potential methods were developed and optimized with respect to cost and benefit aspects This volume summarizes the scientific results of nine interdisciplinary joint projects funded by the German Federal Ministry of Education and Research in the framework of the Research and Development Program GEOTECHNOLOGIEN Highlights and innovations presented cover many length scales and involve targets ranging from applications in the laboratory to ground water surveys of heterogeneous aquifer geotechnical applications like tunnel excavation coal mine and CO2 monitoring and the imaging and monitoring of tectonic and societally relevant objects as active faults and volcanoes To study these objects the authors use the full spectrum of geophysical methods ultrasonics seismic and seismology electromagnetics gravity and airborne in combination with new methods like seismic interferometry diffuse wave field theory and full wave form inversion in 3D and partially also in 4D

**Energy Research Abstracts** ,1995 *Environmental Rock Engineering* S. Murata,T. Saito,2003-01-01 This book is a collection of papers presented at the 1st Kyoto International Symposium on Underground Environment entitled Role of Geo technology to the Underground Environment Consists of nine



keynote papers thirty one technical papers and fifteen papers resulting from the poster presentations each covering a vital aspect of underground engineering      *Instruments, Measurement Principles and Communication Technologies for Downhole Drilling Environments* Chinthaka P. Gooneratne, Bodong Li, Max Deffenbaugh, Timothy Moellendick, 2018-12-30 This book presents a complete review of the unique instruments and the communication technologies utilized in downhole drilling environments These instruments and communication technologies play a critical role in drilling hydrocarbon wells safely accurately and efficiently into a target reservoir zone by acquiring information about the surrounding geological formations as well as providing directional measurements of the wellbore Research into instruments and communication technologies for hydrocarbon drilling has not been explored by researchers to the same extent as other fields such as biomedical automotive and aerospace applications Therefore the book serves as an opportunity for researchers to truly understand how instruments and communication technologies can be used in a downhole environment and to provide fertile ground for research and development in this area A look ahead discussing other technologies such as micro electromechanical systems MEMS and fourth industrial revolution technologies such as automation the industrial internet of things IIoT artificial intelligence and robotics that can potentially be used in the oil gas industry are also presented as well as requirements still need to be met in order to deploy them in the field      **DRILLING ENGINEERING** M. Rafiqul Islam, M. Enamul Hossain, 2020-09-13 Sustainable Oil and Gas Development Series Drilling Engineering delivers research materials and emerging technologies that conform sustainability drilling criteria Starting with ideal zero waste solutions in drilling and long term advantages the reference discusses the sustainability approach through the use of non linear solutions and works its way through the most conventional practices and procedures used today Step by step formulations and examples are provided to demonstrate how to look at conventional practices versus sustainable approaches with eventually diverging towards a more sustainable alternative Emerging technologies are covered and detailed sustainability analysis is included Economic considerations analysis and long term consequences focusing on risk management round out the with conclusions and a extensive glossary Sustainable Oil and Gas Development Series Drilling Engineering gives today s petroleum and drilling engineers a guide how to analyze and evaluate their operations in a more environmentally driven way Proposes sustainable technical criteria and strategies for today s most common drilling practices such as horizontal drilling managed pressure drilling and unconventional shale activity Discusses economic benefits and development challenges to invest in environmentally friendly operations Highlights the most recent research analysis and challenges that remain including global optimization      **Advanced Power Generation Systems** Yatish T. Shah, 2022-12-21 Advanced Power Generation Systems Thermal Sources evaluates advances made in heat to power technologies for conventional combustion heat and nuclear heat along with natural sources of geothermal solar and waste heat generated from the use of different sources These advances will render the landscape of power generation significantly different in just a few decades This book covers the commercial

viability of advanced technologies and identifies where more work needs to be done Since power is the future of energy these technologies will remain sustainable over a long period of time Key Features Covers power generation and heat engines Details photovoltaics thermo photovoltaics and thermoelectricity Includes discussion of nuclear and renewable energy as well as waste heat This book will be useful for advanced students researchers and professionals interested in power generation and energy industries      *Feasibility Study of Seismic-while-drilling Using Hammer Drilling Technology* Shoichi Nakanishi, 1999

## The Enigmatic Realm of **Seismic While Drilling**: Unleashing the Language is Inner Magic

In a fast-paced digital era where connections and knowledge intertwine, the enigmatic realm of language reveals its inherent magic. Its capacity to stir emotions, ignite contemplation, and catalyze profound transformations is nothing lacking extraordinary. Within the captivating pages of **Seismic While Drilling** a literary masterpiece penned by way of a renowned author, readers attempt a transformative journey, unlocking the secrets and untapped potential embedded within each word. In this evaluation, we shall explore the book's core themes, assess its distinct writing style, and delve into its lasting affect the hearts and minds of those who partake in its reading experience.

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