Development Of Reservoir Characterization Techniques And

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Reservoir Characterization of the Pontotoc Group, Robberson Field - Michelle Catherine Blount 2017

The Permian-Pennsylvanian strata of the Robberson field in Garvin County, Oklahoma hosts three prolific oil horizons. The separate stratigraphic evolution of these units has not been subject of previous work. The field is located in the Ardmore basin with structural and stratigraphic influence from the Anadarko Basin, Arbuckle Mountains, Washita Valley Fault, Tishmingo Uplift, and the Wichita Mountains. The Robberson field was discovered in 1920 and oil production started in 1921. The reservoir produces from the interbedded conglomerate and sandstones in the Mauldin, Robberson and Newberry units. Each unit contributes individually to the reservoir's production with contributions varying on location in the field. This thesis examines each unit using an incorporated reservoir characterization technique to include the geological, petrophysical, and available production data to quantify and map detailed reservoir properties useful to improving reservoir development. The evaluation and analysis of facies, well log correlation, and core analysis constrained construction of a set of geological maps was created for the field. This study is an evaluation of the Permian-Pennsylvanian reservoir, within the Vanoss formation of the Robberson field, based on geological and petrophysical characterization with specific evaluation of sediment source and the geological influence on production. The Robberson field is composed of arkosic sandstones, conglomerates and mudstone that a form complex stratigraphic architecture, variable lithofacies and heterogeneous reservoir properties. Isopach maps created by separating the formation into individual genetic units showed horizontal variability in the studied rocks. The structural model was constructed using the formation tops that were studied rocks. The structural model was constructed using the formation tops that were identified in well logs integrated with the fault interpretation. Individual sand thicknesses vary within the reservoir.

Carbonate Reservoir Characterization: A Geologic-Engineering Analysis - S.J. Mazzullo 1996-11-22

This second volume on carbonate reservoirs completes the two-volume treatise on this important topic for petroleum engineers and geologists. Together, the volumes form a complete, modern reference to the properties and production behaviour of carbonate petroleum reservoirs. The book contains valuable glossaries to geologic and petroleum engineering terms providing exact definitions for writers and speakers.

Lecturers will find a useful appendix devoted to questions and problems that can be used for teaching assignments as well as a guide for lecture development. In addition, there is a chapter devoted to core analysis of carbonate rocks which is ideal for laboratory instruction. Managers and production engineers will find a review of the latest laboratory technology for carbonate formation evaluation in the chapter on core analysis. The modern classification of carbonate rocks is presented with petroleum production performance and overall characterization using seismic and well test analyses. Separate chapters are devoted to the important naturally fractured and chalk reservoirs. Throughout the book, the emphasis is on formation evaluation and performance. This two-volume work brings together the wide variety of approaches to the study of carbonate reservoirs and will therefore be of value to managers, engineers, geologists and lecturers.

Unconventional Oil and Gas Resources Handbook - Y Zee Ma 2015-10-06

Unconventional Oil and Gas Resources Handbook: Evaluation and Development is a must-have, helpful handbook that brings a wealth of information to engineers and geoscientists. Bridging between subsurface and production, the handbook provides engineers and geoscientists with effective methodology to better define resources and reservoirs. Better reservoir knowledge and innovative technologies are making unconventional resources economically possible, and multidisciplinary approaches in evaluating these resources are critical to successful development. Unconventional Oil and Gas Resources Handbook takes this approach, covering a wide range of topics for developing these resources including exploration, evaluation, drilling, completion, and production. Topics include theory, methodology, and case histories and will help to improve the understanding,integrated evaluation, and effective development of unconventional resources. Presents methods for a full development cycle of unconventional resources, from exploration through production Explores multidisciplinary integrations for evaluation and development of unconventional resources and covers a broad range of reservoir characterization methods and development scenarios Delivers balanced information with multiple contributors from both academia and industry Provides case histories involving geological analysis, geomechanical analysis, reservoir modeling, hydraulic fracturing treatment, microseismic monitoring, well performance and refracturing for development of unconventional reservoirs

Multifrequency Electromagnetic Data Interpretation for Subsurface Characterization - Siddharth Misra 2021-07-13

Multifrequency Electromagnetic Data Interpretation for Subsurface Characterization focuses on the development and application of electromagnetic measurement methodologies and their interpretation techniques for subsurface characterization. The book guides readers on how to characterize and understand materials using electromagnetic measurements, including dielectric permittivity, resistivity and conductivity measurements. This reference will be useful for subsurface engineers, petrophysicists, subsurface data analysts, geophysicists, hydrogeologists, and geoscientists who want to know how to develop tools and techniques of electromagnetic measurements and interpretation for subsurface characterization. Includes case studies to add additional color to the presented content Provides codes for the mechanistic modeling of multi-frequency conductivity and relative permittivity of porous geomaterials Presents detailed descriptions of multifrequency electromagnetic data interpretation models and inversion algorithm

Application of Advanced Reservoir Characterization, Simulation and Production Optimization Strategies to Maximize Recovery in Slope and Basin

Clastic Reservoirs, West Texas (Delaware Basin). Annual Report - 1997
The objective of this project is to demonstrate that detailed reservoir characterization of slope and basin clastic reservoirs in sandstones of the Delaware Mountain Group in the Delaware Basin of West Texas and New Mexico is a cost-effective way to recover a higher percentage of the original oil in place through strategic placement of infill wells and geologically based field development. This project involves reservoir characterization of two Late Permian slope and basin clastic reservoirs in the Delaware Basin, West Texas, followed by a field demonstration in one of the fields. The fields being investigated are Geraldine Ford and Ford West fields in Reeves and Culberson Counties, Texas. Project objectives are divided into two major phases, reservoir characterization and implementation. The objectives of the reservoir characterization phase of the project were to provide a detailed understanding of the architecture and heterogeneity of the two fields, the Ford Geraldine unit and Ford West field. Reservoir characterization utilized 3-D seismic data, high-resolution sequence stratigraphy, subsurface field studies, outcrop characterization, and other techniques. Once reservoir characterized was completed, a pilot area of approximately 1 mi2 at the northern end of the Ford Geraldine unit was chosen for reservoir simulation. This report summarizes the results of the second year of reservoir characterization.
Unconventional Reservoir Rate-Transient Analysis - Clarkson C.R. 2021-06-15
Unconventional Reservoir Rate-Transient Analysis provides petroleum engineers and geoscientists with the first comprehensive review of rate-transient analysis (RTA) methods as applied to unconventional reservoirs. Volume One—Fundamentals, Analysis Methods, and Workflow is comprised of five chapters which address key concepts and analysis methods used in RTA. This volume overviews the fundamentals of RTA, as applied to low-permeability oil and gas reservoirs exhibiting simple reservoir and fluid characteristics. Volume Two—Application to Complex Reservoirs, Exploration and Development is comprised of four chapters that demonstrate how RTA can be applied to coalbed methane reservoirs, shale gas reservoirs, and low-permeability/shale reservoirs exhibiting complex behavior such as multiphase flow. Use of RTA to assist exploration and development programs in unconventional reservoirs is also demonstrated. This book will serve as a critical guide for students, academics, and industry professionals interested in applying RTA methods to unconventional reservoirs. Gain a comprehensive review of key concepts and analysis methods used in modern rate-transient analysis (RTA) as applied to low-permeability ("tight") oil and gas reservoirs Improve your RTA methods by providing reservoir/hydraulic fracture properties and hydrocarbon-in-place estimates for unconventional gas and light oil reservoirs exhibiting complex reservoir behaviors Understand the provision of a workflow for confident application of RTA to unconventional reservoirs
Reservoir Characterization, Modeling and Quantitative Interpretation - V.P. Dimri 2023-09-01
Reservoir Characterization, Modeling and Quantitative Interpretation: Recent Workflows to Emerging Technologies offers a wide spectrum of reservoir characterization techniques and technologies, focusing on the latest breakthroughs and most efficient methodologies in hydrocarbon exploration and development. Topics covered include 4D seismic technologies, AVAz inversion, fracture characterization, multiscale imaging technologies, static and dynamic reservoir characterization, among others. The content is delivered through an inductive approach, which will help readers gain comprehensive insight on advanced practices and be able to relate them to other subareas of reservoir characterization including CO2 storage and data-driven

modeling. The chapters also include cases studies and real-world, expert guidance on how the new principles described can be implemented in practical scenarios. This will be especially useful for field scientists in collecting and analyzing field data, prospect evaluation, developing reservoir models, and adopting new technologies to mitigate exploration risk. They will be able to solve the practical and challenging problems faced in the field of reservoir characterization, as it will offer systematic industrial workflows covering every aspect of this branch of Earth Science, including subsurface geoscientific perspectives of carbon geosequestration. Reservoir Characterization, Modeling and Quantitative Interpretation is a 21st Century guide for exploration geologists, geoscience students at postgraduate level and above, and petrophysicists working in the oil and gas industry who need the latest techniques in reservoir characterization.

Strategies for Reservoir Characterization and Identification of Incremental Recovery Opportunities in Mature Reservoirs in Frio Fluvial-Deltaic Sandstones, South Texas - 1995

Fluvial-deltaic sandstone reservoirs in the United States are being abandoned at high rates, yet they still contain more than 34 billion barrels of unrecovered oil. The mature Oligocene-age fluvial-deltaic reservoirs of the Frio Formation along the Vicksburg Fault Zone in South Texas are typical of this class in that, after more than three decades of production, they still contain 61 percent of the original mobile oil in place, or 1.6 billion barrels. This resource represents a tremendous target for advanced reservoir characterization studies that integrate geological and engineering analysis to locate untapped and incompletely drained reservoir compartments isolated by stratigraphic heterogeneities. The D and E reservoir intervals of Rincon field, Starr County, South Texas, were selected for detailed study to demonstrate the ability of advanced characterization techniques to identify reservoir compartmentalization and locate specific infield reserve-growth opportunities. Reservoir architecture, determined through high-frequency genetic stratigraphy and facies analysis, was integrated with production history and facies-based petrophysical analysis of individual flow units to identify recompletion and geologically targeted infill drilling opportunities. Estimates of original oil in place versus cumulative production in D and E reservoirs suggest that potential reserve growth exceeds 4.5 million barrels. Comparison of reservoir architecture and the distribution of completions in each flow unit indicates a large number of reserve-growth opportunities. Potential reserves can be assigned to each opportunity by constructing an Sooh map of remaining mobile oil, which is the difference between original oil in place and the volumes drained by past completions.

Handbook of Borehole Acoustics and Rock Physics for Reservoir Characterization - Vimal Saxena 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

Geophysical Exploration Technology - Ming Li 2014-02-06

Authored by one of the world's hydrocarbon exploration experts, Geophysical Exploration Technology: Applications in Lithological and Stratigraphic Reservoirs presents the latest technological advancements and cutting edge techniques in reservoir theory, research and exploration. Stratigraphic and lithological reservoirs play a critical role in increasing the production from oil reserves and new hydrocarbon sources. Recent resource evaluations indicate that onshore stratigraphic and subtle reservoirs account for as much as 40% of the total remaining hydrocarbon sources globally. As a result, these reservoirs will be the most practical, potential and prevalent fields for long-lasting onshore exploration. Intended as an aid in developing an understanding of the techniques of reservoir exploration, this book presents the latest and most practical methods and technology in oil and gas exploration. It can be used as a training book for lithological stratigraphic exploration and a reference for scientific and technological personnel in the oil and gas industry. Authored by one of the world's foremost experts in stratigraphic and lithological reservoir exploration who has more than 30 years of experience in research and instruction. Features more than 200 figures, illustrations, and working examples to aid the reader in retaining key concepts Presents the latest technological developments in reservoir exploration techniques Integrates theory and application, arming readers with a rigorous yet practical approach to hydrocarbon exploration in stratigraphic and lithological reservoirs

Integrated Geosteering Workflow for Optimal Well Trajectory - Zhongqi Wang 2017

The enormous upfront expense of developing heterogeneous reservoirs and the desire to increase ultimate recovery has spurred oil companies to develop and use innovative reservoir characterization techniques. Geostatistics is a technique using a branch of statistics focusing on spatial datasets and was developed originally to predict probability distributions of ore grades for mining operations. Geostatistically derived reservoir modeling is perhaps the most successful means of improving performance predictions in heterogeneous reservoirs. A reliable geostatistical model can be used to guide the drilling path at field scale and make a more scientific field development plan. The objective of this study is to optimize production performance by combined geostatistical algorithms, Logging While Drilling techniques and reservoir simulation methods. Formation petrol-physics models are built with Kriging and Sequential Gaussian simulation methods and then updated with real time Logging While Drilling data to guide the drilling process and finally compare the model difference with production indices. The data used in this study is from E-Segment Norne Field located in the Norwegian Sea. 2-D and 3-D porosity & permeability geostatistical models and a simple reservoir simulation model are built to describe the formation porosity and permeability regional distribution. A new well trajectory is designed based on updated models. The results demonstrate that new well trajectories significantly improve the production performance with the updated models, which reflects the importance of geostatistics in treatment of reservoir heterogeneity.

Tight Oil Reservoirs - Hadi Belhaj 2023-02-01

Tight Oil Reservoirs: Characterization, Modeling, and Field Development, the latest release in the Unconventional Reservoir Engineering Series, delivers a full spectrum of reservoir engineering guidelines so that the engineer can focus on every stage of development specific to tight oil. Covering characterization, micro- and nano-scale modeling, drilling horizontally, completing hydraulic fracturing, and field development, each section includes case studies, practice exercises, and future references for even deeper understanding. Rounding out with coverage on field economics and remaining challenges, this book puts control in the engineer's hands. In this ongoing series, each release will discuss the latest resources, explain their importance in the market, show the benefits of the resource through the latest research, provide details and protocols on how to evaluate and develop the resource, and give case studies and practice questions to gain practicality. Supports the petroleum engineer with a structured table of contents focused on one unconventional resource, making research and solutions easier to find Covers the full spectrum of reservoir engineering, including modern research, development and field development Applies practicality with case studies, exercises and references included in every chapter

DEVELOPMENT OF RESERVOIR CHARACTERIZATION TECHNIQUES AND PRODUCTION MODELS FOR EXPLOITING NATURALLY FRACTURED RESERVOIRS. - 2002

For many years, geoscientists and engineers have undertaken research to characterize naturally fractured reservoirs. Geoscientists have focused on understanding the process of fracturing and the subsequent measurement and description of fracture characteristics. Engineers have concentrated on the fluid flow behavior in the fracture-porous media system and the development of models to predict the hydrocarbon production from these complex systems. This research attempts to integrate these two complementary views to develop a quantitative reservoir characterization methodology and flow performance model for naturally fractured reservoirs. The research has focused on estimating naturally fractured reservoir properties from seismic data, predicting fracture characteristics from well logs, and developing a naturally fractured reservoir simulator. It is important to develop techniques that can be applied to estimate the important parameters in predicting the performance of naturally fractured reservoirs. This project proposes a method to relate seismic properties to the elastic compliance and permeability of the reservoir based upon a sugar cube model. In addition, methods are presented to use conventional well logs to estimate localized fracture information for reservoir characterization purposes. The ability to estimate fracture information from conventional well logs is very important in older wells where data are often limited. Finally, a desktop naturally fractured reservoir simulator has been developed for the purpose of predicting the performance of these complex reservoirs. The simulator incorporates vertical and horizontal wellbore models, methods to handle matrix to fracture fluid transfer, and fracture permeability tensors. This research project has developed methods to characterize and study the performance of naturally fractured reservoirs that integrate geoscience and engineering data. This is an important step in developing exploitation strategies for optimizing the recovery from naturally fractured reservoir systems. The next logical extension of this work is to apply the proposed methods to an actual field case study to provide information for verification and modification of the techniques and simulator. This report provides the details of the proposed techniques and summarizes the activities undertaken during the course of this project. Technology transfer activities were highlighted by a two-day technical conference held in Oklahoma City in June 2002. This conference attracted over 90

participants and included the presentation of seventeen technical papers from researchers throughout the United States.

Carbonate Reservoir Characterization - F. Jerry Lucia 2007-11-30

F. Jerry Lucia, working in America's main oil-rich state, has produced a work that goes after one of the holy grails of oil prospecting. One main target in petroleum recovery is the description of the three-dimensional distribution of petrophysical properties on the interwell scale in carbonate reservoirs. Doing so would improve performance predictions by means of fluid-flow computer simulations. Lucia's book focuses on the improvement of geological, petrophysical, and geostatistical methods, describes the basic petrophysical properties, important geology parameters, and rock fabrics from cores, and discusses their spatial distribution. A closing chapter deals with reservoir models as an input into flow simulators.

Experimental Design in Petroleum Reservoir Studies - Mohammad Jamshidnezhad 2015-04-16

One of the main duties for reservoir engineers is reservoir study, which starts when a reservoir is explored and it continues until the reservoir abandonment. Reservoir study is a continual process and due to various reasons such as complexity at the surface and limited data, there are many uncertainties in reservoir modelling and characterization causing difficulties in reasonable history-matching and prediction phases of study. Experimental Design in Petroleum Reservoir Studies concentrates on experimental design, a trusted method in reservoir management, to analyze and take the guesswork out of the uncertainties surrounding the underdeveloped reservoir. Case studies from the Barnett shale and fractured reservoirs in the Middle East are just some of the practical examples included. Other relevant discussions on uncertainty in PVT, field performance data, and relevant outcomes of experimental design all help you gain insight into how better data can improve measurement tools, your model, and your reservoir assets. Apply the practical knowledge and know-how now with real-world case studies included Gain confidence in deviating uncertain parameters surrounding the underdeveloped reservoir with a focus on application of experimental design Alleviate some of the guesswork in history-matching and prediction phrases with explanations on uncertainty analysis

Volcanic Gas Reservoir Characterization - Qiquan Ran 2014-03-27

Volcanic gas reservoirs are the new natural gas frontier. Once thought too complex, too harsh on the drilling bit, and too difficult to characterize, reservoir engineers and petroleum geologists alike now manage more advanced seismic and logging tools, making these "impossible" field developments possible. Bridging meaningful information about these complicated provinces and linking various unconventional methods and techniques, Volcanic Gas Reservoir Characterization: Describes a set of leading-edge integrated volcanic gas reservoir characterization techniques, helping to ensure the effective development of the field Reveals the grade and relationship of volcanic stratigraphic sequence Presents field identification and prediction methods, and interpretation technology of reservoir parameters, relating these to similar complex fields such as shale These innovative approaches and creative methods have been successfully applied to actual development of volcanic gas reservoirs. By sharing the methods and techniques used in this region with reservoir engineers and petroleum geologists all over the world, those with better understanding of these unconventional basins will begin to consider volcanic rock like any other reservoir. Summarizes the research and explains detailed case studies of volcanic gas reservoir developments, showing the latest achievements and lessons learned Supplies knowledge on volcanic gas reservoir basins to provide meaningful insight into similar complex reservoirs such as shale, coal bed methane, and heavy oil basins Contains extensive methodology,

strong practicality and high innovation, making this an ideal book for both the practicing and seasoned reservoir engineer and petroleum geologists working with complex reservoirs

Developing and Managing a Comprehensive Reservoir Analysis Model - Richard J. Hayes 1988

The Corps' Hydrologic Engineering Center (HEC) has developed a generalized simulation model capable of analyzing complex river-reservoir systems. The development of the model, 'HEC-5, Simulation of Flood Control and Conservation Systems' (Eichert, 1974, 1975) has been paced by the changing mission of the Corps as well as the evolution of computer systems. HEC-5 development and management, including code development, testing, documentation, training and field application experience, is discussed. (fr).

Demonstration of High-resolution Inverse VSP for Reservoir Characterization Applications - Jorge O. Parra 1992

Department of Energy's Fossil Energy Research and Development, and Clean Coal Technology Programs - United States. Congress. Senate. Committee on Energy and Natural Resources. Subcommittee on Energy Research and Development 1989

Fine Reservoir Description - Huanqing Chen 2022-07-20

Fine Reservoir Description: Techniques, Current Status, Challenges and Solutions presents studies on fine oil and gas reservoirs, covering aspects of current status and progress, content and methods/techniques, as well as challenges and solutions through literature review and case studies of reservoirs, including volcanic rocks in the Songliao Basin, glutenite at the northwestern margin of the Junggar Basin, and sandstone in the Liaohe Basin, China. This book contains a large amount of data and illustrations. Provides a comprehensive overview of the latest advances in refined reservoir characterization for three types of reservoirs: high water cut, low permeability, and complex lithology Includes methods and techniques of fine reservoir description that are elaborated from nine aspects, such as fine stratigraphic division and correlation, fracture characterization and fine characterization of sand body Presents eight easy to use measures that are proposed to solve the problems of fine reservoir description

Applied Techniques to Integrated Oil and Gas Reservoir Characterization - Enwenode Onajite 2021-04-09

Over the past several years, there has been a growing integration of data – geophysical, geological, petrophysical, engineering-related, and production-related – in predicting and determining reservoir properties. As such, geoscientists now must learn the technology, processes, and challenges involved within their specific functions in order to optimize planning for oil field development. Applied Techniques to Integrated Oil and Gas Reservoir Characterization presents challenging questions encountered by geoscientists in their day-to-day work in the exploration and development of oil and gas fields and provides potential solutions from experts. From basin analysis of conventional and unconventional reservoirs, to seismic attributes analysis, NMR for reservoir characterization, amplitude versus offset (AVO), well-to-seismic tie, seismic inversion studies, rock physics, pore pressure prediction, and 4D for reservoir monitoring, the text examines challenges in the industry as well as the techniques used to overcome those challenges. This book includes valuable contributions from global industry experts: Brian Schulte (Schiefer Reservoir Consulting), Dr. Neil W. Craigie (Saudi Aramco), Matthijs van der Molen (Shell International E&P), Dr. Fred W. Schroeder (ExxonMobil, retired), Dr. Tharwat Hassane (Schlumberger & BP, retired), and others. Presents a thorough understanding of the requirements of various disciplines in

characterizing a wide spectrum of reservoirs Includes real-life problems and challenging questions encountered by geoscientists in their day-to-day work, along with answers from experts working in the field Provides an integrated approach among different disciplines (geology, geophysics, petrophysics, and petroleum engineering) Offers advice from industry experts to geoscience students, including career guides and interview tips

Reservoir Development - M. Rafiqul Islam 2021-12-04

Sustainable Oil and Gas Development Series: Reservoir Development delivers research materials and emerging technologies that conform sustainability in today's reservoirs. Starting with a status of technologies available, the reference describes sustainability as it applies to fracturing fluids, particularly within unconventional reservoirs. Basement reservoirs are discussed along with non-energy applications of fluids. Sustainability considerations for reserve predication are covered followed by risk analysis and scaling guidelines for further field development. Rounding out with conclusions and remaining challenges, Sustainable Oil and Gas Development Series: Reservoir Development gives today and future petroleum engineers a focused and balanced path to strengthen sustainability practices. Gain insight to more environmentally-friendly protocols for both unconventional and basement reservoirs, including non-energy applications of reservoir fluids Determine more accurate reserves and keep budgets in line while focusing on emission reduction Learn from a well-known author with extensive experience in both academia and industry

Practical Solutions to Integrated Oil and Gas Reservoir Analysis - Enwenode Onajite 2017-05-19

Practical Solutions to Integrated Oil and Gas Reservoir Analysis: Geophysical and Geological Perspectives is a well-timed source of information addressing the growing integration of geophysical, geological, reservoir engineering, production, and petrophysical data in predicting and determining reservoir properties. These include reservoir extent and sand development away from the well bore, characterizations of undrilled prospects, and optimization planning for field development. As such, geoscientists must now learn the technology, processes, and challenges involved within their specific functions in order to complete day-to-day activities. A broad collection of real-life problems and challenging questions encountered by geoscientists in the exploration and development of oil and gas fields, the book treats subjects ranging from Basin Analysis, to identifying and mapping structures, stratigraphy, the distribution of fracture, and the identification of pore fluids. Looking at the well-to-seismic tie, time-to-depth conversion, AVO analysis, seismic inversion, rock physics, and pore pressure analysis/prediction, the text examines challenges encountered in these technical areas, and also includes solutions and techniques used to overcome those challenges. Presents a thorough understanding of the contributions and issues faced by the various disciplines that contribute towards characterizing a wide spectrum of reservoirs (Conventional, Shale Oil and Gas, as well as Carbonate reservoirs) Provides a much needed and integrated approach amongst disciplines including geology, geophysics, petrophysics, reservoir and drilling engineering Includes case studies on different reservoir settings from around the world including Western Canadian Sedimentary Basin, Gulf of Guinea, Gulf of Mexico, Milne point field in Alaska, North-Sea, San Jorge Basin, and Bossier and Haynesville Shales, and others to help illustrate key points

Seismic Attributes for Prospect Identification and Reservoir Characterization - Satinder Chopra 2007

Seismic attributes play a key role in exploration and exploitation of hydrocarbons. In Seismic Attributes for

Prospect Identification and Reservoir Characterization (SEG Geophysical Developments No. 11), Satinder Chopra and Kurt J. Marfurt introduce the physical basis, mathematical implementation, and geologic expression of modern volumetric attributes including coherence, dip/azimuth, curvature, amplitude gradients, seismic textures, and spectral decomposition. The authors demonstrate the importance of effective color display and sensitivity to seismic acquisition and processing. Examples from different basins illustrate the attribute expression of tectonic deformation, clastic depositional systems, carbonate depositional systems and diagenesis, drilling hazards, and reservoir characterization. The book is illustrated generously with color figures throughout. "Seismic Attributes" will appeal to seismic interpreters who want to extract more information from data; seismic processors and imagers who want to learn how their efforts impact subtle stratigraphic and fracture plays; sedimentologists, stratigraphers, and structural geologists who use large 3D seismic volumes to interpret their plays within a regional, basinwide context; and reservoir engineers whose work is based on detailed 3D reservoir models. Copublished with EAGE.

Reservoir Characterization - Larry Lake 2012-12-02

Reservoir Characterization is a collection of papers presented at the Reservoir Characterization Technical Conference, held at the Westin Hotel-Galleria in Dallas on April 29-May 1, 1985. Conference held April 29-May 1, 1985, at the Westin Hotel—Galleria in Dallas. The conference was sponsored by the National Institute for Petroleum and Energy Research, Bartlesville, Oklahoma. Reservoir characterization is a process for quantitatively assigning reservoir properties, recognizing geologic information and uncertainties in spatial variability. This book contains 19 chapters, and begins with the geological characterization of sandstone reservoir, followed by the geological prediction of shale distribution within the Prudhoe Bay field. The subsequent chapters are devoted to determination of reservoir properties, such as porosity, mineral occurrence, and permeability variation estimation. The discussion then shifts to the utility of a Bayesian-type formalism to delineate qualitative ""soft"" information and expert interpretation of reservoir description data. This topic is followed by papers concerning reservoir simulation, parameter assignment, and method of calculation of wetting phase relative permeability. This text also deals with the role of discontinuous vertical flow barriers in reservoir engineering. The last chapters focus on the effect of reservoir heterogeneity on oil reservoir. Petroleum engineers, scientists, and researchers will find this book of great value.

Carbonate Reservoir Heterogeneity - Vahid Tavakoli 2019-11-11

This book provides a comprehensive overview of the parameters and factors that cause heterogeneity in carbonate reservoirs, and examines how they interact with one another. It explores the various scales of heterogeneity, how they are caused, and how they can be minimized, as well as how the scales affect each other, providing practical examples in each chapter. The book concludes by discussing the effect of heterogeneity on petrophysical evaluations. As reducing heterogeneity is the only way to obtain accurate carbonate reservoir characteristics at the regional scale, the book offers an important reference guide for all geologists, engineers, and modelers working with subsurface data.

Stratigraphic Reservoir Characterization for Petroleum Geologists, Geophysicists, and Engineers - Roger M. Slatt 2013-11-21

This chapter has summarized the concepts, techniques, and definitions of sequence stratigraphy. As in most subdivisions of geology, sequence stratigraphers have developed their own set of definitions and terminology, which have been outlined here for use in subsequent chapters. It is

proposed that sequence stratigraphy form the basis for reservoir characterization, as will be expanded upon in subsequent chapters.

Stratigraphic Reservoir Characterization for Petroleum Geologists, Geophysicists, and Engineers - Roger M. Slatt 2013-11-21

Reservoir quality controls the storage, distribution, and flow of fluids within a reservoir. Porosity and permeability are key parameters that are readily measured on rock samples and from well logs; with calibration, porosity can be mapped from 3D seismic surveys. If core material is obtained from a well and porosity and permeability measurements are made on the core, the values can be compared with porosity logs and a permeability log can be developed. Although “flow units” can be determined using a suite of geologic and petrophysical parameters, method uses only the three easily obtained wellbore parameters of porosity, permeability, and thickness to calculate flow units in terms of their capacity to store and transmit fluids within the reservoir. Three-dimensional flow-unit models of a reservoir can be used for reservoir fluid-flow and performance simulation. Flow units can be upscaled, as needed, to meet the requirements of computing time and capability. Capillary properties of a rock also affect the storage and flow of fluids through the rock. Capillary properties are routinely measured and used to determine fluid saturations, height of the oil column above the free water level, and maximum height of the column that can be retained by a reservoir topseal. These are very important parameters for characterizing a reservoir for development and management purposes. Values of porosity, permeability, and capillarity will vary not only according to the nature of rocks comprising a reservoir but also according to the way in which the values were obtained. Caution is the key to interpreting laboratory-derived data, and it is worth knowing just how and where on a rock sample the measurements were made prior to using them for reservoir characterization. Also, upscaling or averaging values such as Sw can provide misleading results, particularly in thin-bedded stratigraphic intervals. The greater the amount of upscaling, the less realistic the reservoir geologic model becomes!

Anisotropic Seismic Characterization of the Eagle Ford Shale - Qi Ren 2016

Quantitative reservoir characterization using integrated seismic data and well log data is important in sweet spot identification, well planning, and reservoir development. The process includes building up the relations between rock properties and elastic properties through rock physics modeling, inverting for elastic properties from seismic data, and inverting for rock properties from both seismic data and rock physics models. Many quantitative reservoir characterization techniques have been developed for conventional reservoirs. However, challenges remain when extending these methods to unconventional reservoirs because of their complexity, such as anisotropy, micro-scale fabric, and thin beds issues. This dissertation focuses on developing anisotropic rock physics modeling method and seismic inversion method that are appliable for unconventional reservoir characterization. The micro-scale fabric, including the complex composition, shape and alignment of clay minerals, pore space, and kerogen, significantly influences the anisotropic elastic properties. I developed a comprehensive three-step rock-physics approach to model the anisotropic elastic properties, accounting for the micro-scale fabric. In addition, my method accounts for the different pressure-dependent behaviors of P-waves and S-waves. The modeling provides anisotropic stiffnesses and pseudo logs of anisotropy parameters. The application of this method on the Upper Eagle Ford Shale shows that the clay content kerogen content and porosity decrease the rock stiffness. The anisotropy increases with kerogen content, but the influence of clay content is more complex. Comparing the anisotropy parameter pseudo logs with clay content shows that

clay content increases the anisotropy at small concentrations; however, the anisotropy stays constant, or even slightly decreases, as clay content continues to increase. Thin beds and anisotropy are two important limitation of the application of seismic characterization on unconventional reservoirs. I introduced the geostatistics into stochastic seismic inversion. The geostatistical models, based on well log data, simulate small-scale vertical variations that are beyond seismic resolution. This additional information compensates the seismic data for its band-limited nature. I applied this method on the Eagle Ford Shale, using greedy annealing importance sampling as inversion algorithm. The thin Lower Eagle Ford Formation, which cannot be resolved by conventional inversion method, is clearly resolved in the inverted impedance volume using my method. In addition, because anisotropy is accounted for in the forward modeling, the accuracy of inverted S-impedance is significantly improved.

Reservoir Characterization of Tight Gas Sandstones - Ali Kadkhodaie 2022-08-22

Reservoir Characterization of Tight Gas Sandstones: Exploration and Development is essential reading for those working in oil and gas exploration (both in industry and academia) as it contains chapters that help them further understand all aspects of tight gas reservoirs. In this book, experts in industry and academia update readers on new methods of tight gas reservoir modeling and evaluation. As there are very limited published books in the field of tight sandstones, this book will benefit readers by making them familiar with state-of-art methods of tight gas sandstones characterization and evaluation. Features case studies from countries with considerable tight gas sandstones such as the United States, China, Canada and Australia Includes recent developments in sedimentological, petrophysical, reservoir modeling and fracking technologies of tight gas sandstone reservoirs Covers applications for the characterization and evaluation of tight sandstones for the methodologies presented

Practical Reservoir Engineering and Characterization - Richard O. Baker 2015-04-30

Practical Reservoir Characterization expertly explains key technologies, concepts, methods, and terminology in a way that allows readers in varying roles to appreciate the resulting interpretations and contribute to building reservoir characterization models that improve resource definition and recovery even in the most complex depositional environments. It is the perfect reference for senior reservoir engineers who want to increase their awareness of the latest in best practices, but is also ideal for team members who need to better understand their role in the characterization process. The text focuses on only the most critical areas, including modeling the reservoir unit, predicting well behavior, understanding past reservoir performance, and forecasting future reservoir performance. The text begins with an overview of the methods required for analyzing, characterizing, and developing real reservoirs, then explains the different methodologies and the types and sources of data required to characterize, forecast, and simulate a reservoir. Thoroughly explains the data gathering methods required to characterize, forecast, and simulate a reservoir Provides the fundamental background required to analyze, characterize, and develop real reservoirs in the most complex depositional environments Presents a step-by-step approach for building a one, two, or three-dimensional representation of all reservoir types

Dynamic Description Technology of Fractured Vuggy Carbonate Gas Reservoirs - Hedong Sun 2019-04-15

Thanks to technology, fractured carbonate gas reservoirs are becoming more discoverable, but because these assets are more complex and diverse, there is a high level of difficulty in understanding how to plan design and performance analysis. Dynamic Description Technology of Fractured Vuggy Gas Reservoirs delivers a

critical reference to reservoir and production engineers on all the basic characteristics of fractured vuggy gas reservoirs and combines both static and dynamic data to improve the reservoir characterization accuracy and development. Based on the full life cycle of well testing and advanced production decline analysis, this reference also details how to apply reservoir dynamic evaluation, reserve estimation, and performance forecasting. Offering one collective location for the latest research on fractured gas reservoirs, the reference also covers: Physical models, analysis examples, and processes 3D numerical well test analysis technology Deconvolution technology of production decline analysis Packed with many calculation examples and more than 100 case studies, Dynamic Description Technology of Fractured Vuggy Gas Reservoirs gives engineers a strong tool to further exploit these complex assets. Gain advanced knowledge in well test and production decline analysis as well as performance forecasting specific to fractured vuggy carbonate gas reservoirs Understand the characteristics, advantages, disadvantages, and current limitations in technology of fractured vuggy carbonate gas reservoirs Bridge from theory to practice by combining static and dynamic data to form more accurate real-world analysis and modelling

Giant Hydrocarbon Reservoirs of The World - Paul Mitchell Harris 2006

Reservoirs described in this volume are located in the Middle East, Asia, West Africa, North and South America. The authors explore historical and alternative approaches to reservoir description, characterization, and management, as well as examining appropriate levels and timing of data gathering, technology applications, evaluation techniques, and management practices in various stages in the life of individual development projects. The giant fields discussed address issues important to reservoir description, characterization, and management from both geologic & engineering perspectives.

Energy and Water Development Appropriations for 2013: Dept. of Energy FY 2013 justifications - United States. Congress. House. Committee on Appropriations. Subcommittee on Energy and Water Development 2012

Development of Volcanic Gas Reservoirs - Qiquan Ran 2018-09-29

Development of Volcanic Gas Reservoirs: The Theory, Key Technologies and Practice of Hydrocarbon Development introduces the geological and dynamic characteristics of development in volcanic gas reservoirs, using examples drawn from the practical experience in China of honing volcanic gas reservoir development. The book gives guidance on how to effectively develop volcanic gas reservoirs and similar complex types of gas reservoir. It introduces basic theories, key technologies and uses practical examples. It is the first book to systematically cover the theories and key technologies of volcanic gas reservoir development. As volcanic gas reservoirs constitute a new research area, the distribution and rules for development still being studied. Difficulties in well deployment and supportive development technology engender further challenges to development. However, in the past decade, research and development in the Songliao and Junggar Basins has led to marked achievements in volcanic gas reservoir development. Introduces the theory, key technologies and practice of volcanic gas reservoir development Provides links between theory and practice, highlighting key technologies for targeted development Offers guidance on complex issues in volcanic gas reservoir development Presents practical evidence from effective development and exploitation of gas reservoirs

Advanced Oil Recovery Technologies for Improved Recovery from Slope Basin Clastic Reservoirs, Nash Draw Brushy Canyon Pool, Eddy County, NM. - Mark B. Murphy 2005

The Nash Draw Brushy Canyon Pool in Eddy County New Mexico was a cost-shared

field demonstration project in the U.S. Department of Energy Class III Program. A major goal of the Class III Program was to stimulate the use of advanced technologies to increase ultimate recovery from slope-basin clastic reservoirs. Advanced characterization techniques were used at the Nash Draw Pool (NDP) project to develop reservoir management strategies for optimizing oil recovery from this Delaware reservoir. The objective of the project was to demonstrate that a development program, which was based on advanced reservoir management methods, could significantly improve oil recovery at the NDP. Initial goals were (1) to demonstrate that an advanced development drilling and pressure maintenance program can significantly improve oil recovery compared to existing technology applications and (2) to transfer these advanced methodologies to other oil and gas producers. Analysis, interpretation, and integration of recently acquired geological, geophysical, and engineering data revealed that the initial reservoir characterization was too simplistic to capture the critical features of this complex formation. Contrary to the initial characterization, a new reservoir description evolved that provided sufficient detail regarding the complexity of the Brushy Canyon interval at Nash Draw. This new reservoir description was used as a risk reduction tool to identify 'sweet spots' for a development drilling program as well as to evaluate pressure maintenance strategies. The reservoir characterization, geological modeling, 3-D seismic interpretation, and simulation studies have provided a detailed model of the Brushy Canyon zones. This model was used to predict the success of different reservoir management scenarios and to aid in determining the most favorable combination of targeted drilling, pressure maintenance, well stimulation, and well spacing to improve recovery from this reservoir. An Advanced Log Analysis technique developed from the NDP project has proven useful in defining additional productive zones and refining completion techniques. This program proved to be especially helpful in locating and evaluating potential recompletion intervals, which has resulted in low development costs with only small incremental increases in lifting costs. To develop additional reserves at lower costs, zones behind pipe in existing wells were evaluated using techniques developed for the Brushy Canyon interval. These techniques were used to complete uphole zones in thirteen of the NDP wells. A total of 14 recompletions were done: four during 1999, four during 2000, two during 2001, and four during 2002-2003. These workovers added reserves of 332,304 barrels of oil (BO) and 640,363 MCFG (thousand cubic feet of gas) at an overall weighted average development cost of $1.87 per BOE (barrel of oil equivalent). A pressure maintenance pilot project in a developed area of the field was not conducted because the pilot area was pressure depleted, and the reservoir in that area was found to be compartmentalized and discontinuous. Economic analyses and simulation studies indicated that immiscible injection of lean hydrocarbon gas for pressure maintenance was not warranted at the NDP and would need to be considered for implementation in similar fields very soon after production has started. Simulation studies suggested that the injection of miscible carbon dioxide (CO{sub 2}) could recover significant quantities of oil at the NDP, but a source of low-cost CO{sub 2} was not available in the area. Results from the project indicated that further development will be under playa lakes and potash areas that were beyond the regions covered by well control and are not accessible with vertical wells. These areas, covered by 3-D seismic surveys that were obtained as part of the project, were accessed with combinations of deviated/horizontal wells. Three directional/horizontal wells have been drilled and completed to develop reserves under surface-restricted areas and potash mines. The third well has not been on production long enough for an accurate assessment but initial results from it are

encouraging. Cumulative production from the first two wells through August 31, 2005 was 235,039 BO, 816,592 MCFG and 310,333 barrels of water (BW). Total estimated reserves from all three of the horizontal wells are 878,135 BO and 3.87 BCFG. The ratio of net revenue to cost for the first two wells is approximately 2.9 to 1 for an oil price of $30 per barrel that existed when the wells were drilled. Based on recent pricing trends, a detailed reserve study for the project was performed that assumed an oil price of $40 per barrel and a gas price of $7 per MCFG. These results show that this project has acceptable economics and similar projects can be economically developed as long as oil and gas prices remain over $30 per BOE.

Petroleum Reservoir Engineering Practice - Nnaemeka Ezekwe 2010-09-09
The Complete, Up-to-Date, Practical Guide to Modern Petroleum Reservoir Engineering This is a complete, up-to-date guide to the practice of petroleum reservoir engineering, written by one of the world's most experienced professionals. Dr. Nnaemeka Ezekwe covers topics ranging from basic to advanced, focuses on currently acceptable practices and modern techniques, and illuminates key concepts with realistic case histories drawn from decades of working on petroleum reservoirs worldwide. Dr. Ezekwe begins by discussing the sources and applications of basic rock and fluid properties data. Next, he shows how to predict PVT properties of reservoir fluids from correlations and equations of state, and presents core concepts and techniques of reservoir engineering. Using case histories, he illustrates practical diagnostic analysis of reservoir performance, covers essentials of transient well test analysis, and presents leading secondary and enhanced oil recovery methods. Readers will find practical coverage of experience-based procedures for geologic modeling, reservoir characterization, and reservoir simulation. Dr. Ezekwe concludes by presenting a set of simple, practical principles for more effective management of petroleum reservoirs. With Petroleum Reservoir Engineering Practice readers will learn to • Use the general material balance equation for basic reservoir analysis • Perform volumetric and graphical calculations of gas or oil reserves • Analyze pressure transients tests of normal wells, hydraulically fractured wells, and naturally fractured reservoirs • Apply waterflooding, gasflooding, and other secondary recovery methods • Screen reservoirs for EOR processes, and implement pilot and field-wide EOR projects. • Use practical procedures to build and characterize geologic models, and conduct reservoir simulation • Develop reservoir management strategies based on practical principles Throughout, Dr. Ezekwe combines thorough coverage of analytical calculations and reservoir modeling as powerful tools that can be applied together on most reservoir analyses. Each topic is presented concisely and is supported with copious examples and references. The result is an ideal handbook for practicing engineers, scientists, and managers—and a complete textbook for petroleum engineering students.

Application of Advanced Reservoir Characterization, Simulation, and Production Optimization Strategies to Maximize Recovery in Slope and Basin Clastic Reservoirs, West Texas (Delaware Basin). Technical Progress Report - 1996
The objective of this project is to demonstrate that detailed reservoir characterization of slope and basin clastic reservoirs in sandstones of the Delaware Mountain Group in the Delaware Basin of West Texas and New Mexico is a cost effective way to recover a higher percentage of the original oil in place through strategic placement of infill wells and geologically based field development. Project objectives are divided into two major phases. The objectives of the reservoir characterization phase of the project are to provide a detailed understanding of the architecture and heterogeneity of two fields, the Ford Geraldine unit and Ford West field, which

produce from the Bell Canyon and Cherry Canyon Formations, respectively, of the Delaware Mountain Group and to compare Bell Canyon and Cherry Canyon reservoirs. Reservoir characterization will utilize 3-D seismic data, high-resolution sequence stratigraphy, subsurface field studies, outcrop characterization, and other techniques. One the reservoir-characterization study of both field is completed, a pilot area of approximately 1 mi2 in one of the fields will be chosen for reservoir simulation. The objectives of the implementation phase of the project are to: (1) apply the knowledge gained from reservoir characterization and simulation studies to increase recovery from the pilot area; (2) demonstrate that economically significant unrecovered oil remains in geologically resolvable untapped compartments; and (3) test the accuracy of reservoir characterization and flow simulation as predictive tools in resource preservation of mature fields. A geologically designed, enhanced recovery program (CO2 flood, waterflood, or polymer flood) and well-completion program will be developed, and one to three infill well will be drilled and cored. Technical progress is summarized for: geophysical characterization; reservoir characterization; outcrop characterization; and producibility problem characterization.

Artificial Intelligence and Data Analytics for Energy Exploration and Production - Fred Aminzadeh 2022-08-26 ARTIFICAL INTELLIGENCE AND DATA ANALYTICS FOR ENERGY EXPLORATION AND PRODUCTION This groundbreaking new book is written by some of the foremost authorities on the application of data science and artificial intelligence techniques in exploration and production in the energy industry, covering the most comprehensive and updated new processes, concepts, and practical applications in the field. The book provides an in-depth treatment of the foundations of Artificial Intelligence (AI) Machine Learning, and Data Analytics (DA). It also includes many of AI-DA applications in oil and gas reservoirs exploration, development, and production. The book covers the basic technical details on many tools used in “smart oil fields”. This includes topics such as pattern recognition, neural networks, fuzzy logic, evolutionary computing, expert systems, artificial intelligence machine learning, human-computer interface, natural language processing, data analytics and next-generation visualization. While theoretical details will be kept to the minimum, these topics are introduced from oil and gas applications viewpoints. In this volume, many case histories from the recent applications of intelligent data to a number of different oil and gas problems are highlighted. The applications cover a wide spectrum of practical problems from exploration to drilling and field development to production optimization, artificial lift, and secondary recovery. Also, the authors demonstrate the effectiveness of intelligent data analysis methods in dealing with many oil and gas problems requiring combining machine and human intelligence as well as dealing with linguistic and imprecise data and rules.

Stratigraphic reservoir characterization for petroleum geologists, geophysicists, and engineers - Roger M. Slatt 2006-11-03 Reservoir characterization as a discipline grew out of the recognition that more oil and gas could be extracted from reservoirs if the geology of the reservoir was understood. Prior to that awakening, reservoir development and production were the realm of the petroleum engineer. In fact, geologists of that time would have felt slighted if asked by corporate management to move from an exciting exploration assignment to a more mundane assignment working with an engineer to improve a reservoir’s performance. Slowly, reservoir characterization came into its own as a quantitative, multidisciplinary endeavor requiring a vast array of skills and knowledge sets. Perhaps the biggest attractor to becoming a reservoir geologist was the advent of fast computing, followed by visualization programs and theaters, all of which allow young geoscientists to

practice their computing skills in a highly technical work environment. Also, the discipline grew in parallel with the evolution of data integration and the advent of asset teams in the petroleum industry. Finally, reservoir characterization flourished with the quantum improvements that have occurred in geophysical acquisition and processing techniques and that allow geophysicists to image internal reservoir complexities.