



Multiphase Fluid Flow in Porous and Fractured Reservoirs



Yu-Shu Wu



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Multiphase Fluid Flow in Porous and Fractured Reservoirs Yu-Shu Wu, 2015-09-23 Multiphase Fluid Flow in Porous and Fractured Reservoirs discusses the process of modeling fluid flow in petroleum and natural gas reservoirs a practice that has become increasingly complex thanks to multiple fractures in horizontal drilling and the discovery of more unconventional reservoirs and resources The book updates the reservoir engineer of today with the latest developments in reservoir simulation by combining a powerhouse of theory analytical and numerical methods to create stronger verification and validation modeling methods ultimately improving recovery in stagnant and complex reservoirs Going beyond the standard topics in past literature coverage includes well treatment Non Newtonian fluids and rheological models multiphase fluid coupled with geomechanics in reservoirs and modeling applications for unconventional petroleum resources The book equips today s reservoir engineer and modeler with the most relevant tools and knowledge to establish and solidify stronger oil and gas recovery Delivers updates on recent developments in reservoir simulation such as modeling approaches for multiphase flow simulation of fractured media and unconventional reservoirs Explains analytical solutions and approaches as well as applications to modeling verification for today s reservoir problems such as evaluating saturation and pressure profiles and recovery factors or displacement efficiency Utilize practical codes and programs featured from online companion website

Characterization of Fluid Flow in Naturally Fractured Reservoirs. Final Report ,1981 This report summarizes the results of a four month study of the characteristics of multiphase flow in naturally fractured porous media An assessment and evaluation of the literature was carried out and a comprehensive list of references compiled on the subject Mathematical models presented in the various references cited were evaluated along with the stated assumptions or those inherent in the equations Particular attention was focused upon identifying unique approaches which would lead to the formulation of a general mathematical model of multiphase multi component flow in fractured porous media A model is presented which may be used to more accurately predict the movement of multi phase fluids through such type formations Equations of motion are derived for a multiphase multicomponent fluid which is flowing through a double porosity double permeability medium consisting of isotropic primary rock matrix blocks and an anisotropic fracture matrix system The fractures are assumed to have a general statistical distribution in space and orientation A general distribution function called the fracture matrix function is introduced to represent the statistical nature of the fractures

Fluid Flow and Transport in Porous Media, Mathematical and Numerical Treatment Zhangxin Chen, Richard E. Ewing, 2002 The June 2001 conference brought together mathematicians computational scientists and engineers working on the mathematical and numerical treatment of fluid flow and transport in porous media This collection of 43 papers from that conference reports on recent advances in network flow modeling parallel computation optimization upscaling uncertainty reduction media characterization and chemically reactive phenomena Topics include modeling horizontal wells using hybrid grids in reservoir simulation a high

order Lagrangian scheme for flow through unsaturated porous media and a streamline front tracking method for two and three phase flow No index Annotation copyrighted by Book News Inc Portland OR Fractured Vuggy Carbonate Reservoir Simulation Jun Yao,Zhao-Qin Huang,2017-08-08 This book solves the open problems in fluid flow modeling through the fractured vuggy carbonate reservoirs Fractured vuggy carbonate reservoirs usually have complex pore structures which contain not only matrix and fractures but also the vugs and cavities Since the vugs and cavities are irregular in shape and vary in diameter from millimeters to meters modeling fluid flow through fractured vuggy porous media is still a challenge The existing modeling theory and methods are not suitable for such reservoir It starts from the concept of discrete fracture and fracture vug networks model and then develops the corresponding mathematical models and numerical methods including discrete fracture model discrete fracture vug model hybrid model and multiscale models Based on these discrete porous media models some equivalent medium models and methods are also discussed All the modeling and methods shared in this book offer the key recent solutions into this area Advances in the Study of Fractured Reservoirs G.H. Spence,J. Redfern,R. Aguilera,T.G. Bevan,J.W. Cosgrove, G.D. Couples,J.-M. Daniel,2014-08-27 Naturally fractured reservoirs constitute a substantial percentage of remaining hydrocarbon resources they create exploration targets in otherwise impermeable rocks including under explored crystalline basement and they can be used as geological stores for anthropogenic carbon dioxide Their complex behaviour during production has traditionally proved difficult to predict causing a large degree of uncertainty in reservoir development The applied study of naturally fractured reservoirs seeks to constrain this uncertainty by developing new understanding and is necessarily a broad integrated interdisciplinary topic This book addresses some of the challenges and advances in knowledge approaches concepts and methods used to characterize the interplay of rock matrix and fracture networks relevant to fluid flow and hydrocarbon recovery Topics include describing characterizing and identifying controls on fracture networks from outcrops cores geophysical data digital and numerical models geomechanical influences on reservoir behaviour numerical modelling and simulation of fluid flow and case studies of the exploration and development of carbonate siliciclastic and metamorphic naturally fractured reservoirs *Challenges and Recent Advances in Sustainable Oil and Gas Recovery and Transportation* Sanket Joshi,Prashant Jadhawar,Asheesh Kumar,2023-03-10 Challenges and Recent Advances in Sustainable Oil and Gas Recovery and Transportation delivers a critical tool for today's petroleum and reservoir engineers to learn the latest research in EOR and solutions toward more SDG supported practices Packed with methods and case studies the reference starts with the latest advances such as EOR with polymers and EOR with CCS Advances in shale recovery and methane production are also covered before layering on sustainability methods on critical topics such as oilfield produced water Supported by a diverse group of contributors this book gives engineers a go to source for the future of oil and gas The oil and gas industry are utilizing enhanced oil recovery EOR methods frequently but the industry is also tasked with making more sustainable decisions in their future operations Provides the latest advances in enhanced oil recovery EOR

including EOR with polymers EOR with carbon capture and sequestration CCS and hybrid EOR approaches Teaches options in recovery and transport such as shale recovery and methane production from gas hydrate reservoirs Includes sustainability methods such as biological souring and oil field produced water solutions **Hydraulic Fracture Modeling** Yu-Shu Wu, 2017-11-30 Hydraulic Fracture Modeling delivers all the pertinent technology and solutions in one product to become the go to source for petroleum and reservoir engineers Providing tools and approaches this multi contributed reference presents current and upcoming developments for modeling rock fracturing including their limitations and problem solving applications Fractures are common in oil and gas reservoir formations and with the ongoing increase in development of unconventional reservoirs more petroleum engineers today need to know the latest technology surrounding hydraulic fracturing technology such as fracture rock modeling There is tremendous research in the area but not all located in one place Covering two types of modeling technologies various effective fracturing approaches and model applications for fracturing the book equips today s petroleum engineer with an all inclusive product to characterize and optimize today s more complex reservoirs Offers understanding of the details surrounding fracturing and fracture modeling technology including theories and quantitative methods Provides academic and practical perspective from multiple contributors at the forefront of hydraulic fracturing and rock mechanics Provides today s petroleum engineer with model validation tools backed by real world case studies **Fluid Phase Behavior for Conventional and Unconventional Oil and Gas Reservoirs** Alireza Bahadori, 2016-11-24 Fluid Phase Behavior for Conventional and Unconventional Oil and Gas Reservoirs delivers information on the role of PVT pressure volume temperature tests data in various aspects in particular reserve estimation reservoir modeling flow assurance and enhanced oil recovery for both conventional and unconventional reservoirs This must have reference also prepares engineers on the importance of PVT tests how to evaluate the data develop an effective management plan for flow assurance and gain perspective of flow characterization with a particular focus on shale oil shale gas gas hydrates and tight oil making This book is a critical resource for today s reservoir engineer helping them effectively manage and maximize a company s oil and gas reservoir assets Provides tactics on reservoir phase behavior and dynamics with new information on shale oil and gas hydrates Helps readers Improve on the effect of salt concentration and application to CO₂ Acid Gas Disposal with content on water hydrocarbon systems Provides practical experience with PVT and tuning of EOS with additional online excel spreadsheet examples *Fluid-Solid Interactions in Upstream Oil and Gas Applications* Ibnelwaleed A. Hussein, Mohamed Mahmoud, 2023-01-14 Fluid Solid Interactions in Upstream Oil and Gas Applications Volume 78 delivers comprehensive understanding of fluid rock interactions in oil and gas reservoirs and their impact on drilling production and reservoir hydrocarbon management The book is arranged based on intervals of the oil and gas production process and introduces the basics of reservoir fluids and their properties along with the rheological behavior of solid fluid systems across all stages of the reservoir including drilling processes acidizing and fracking The reference then addresses different application specific

issues such as solid fluid interactions in tight reservoirs the applications of nanoparticles interactions during the EOR processes and environmental concerns Introduces the basics of reservoir fluids and their properties as well as the rheological behavior of solid fluid systems Discusses the latest advances in molecular simulations and their reliability Highlights the environmental concerns regarding the application of fluid solid systems

Numerical Simulation of Single-phase and Multiphase Non-Darcy Flow in Porous and Fractured Reservoirs, 2000 A numerical method as well as a theoretical study of non Darcy fluid flow of through porous and fractured reservoirs is described The non Darcy flow is handled in a three dimensional multiphase flow reservoir simulator while the model formulation incorporates the Forchheimer equation for describing single phase or multiphase non Darcy flow and displacement The numerical scheme has been verified by comparing its results against those of analytical methods Numerical solutions are used to obtain some insight into the physics of non Darcy flow and displacement in reservoirs In addition several type curves are provided for well test analyses of non Darcy flow to demonstrate a methodology for modeling this type of flow in porous and fractured rocks including flow in geothermal reservoirs

Trigger Effects in Geosystems Gevorg Kocharyan, Andrey Lyakhov, 2019-11-16 This book is the result of collaboration within the frames of the 5th International Conference Trigger Effects in Geosystems held in the Institute of Geosphere Dynamics of Russian Academy of Sciences June 2019 This book aims to raise awareness about different triggering aspects in the geosphere and its effects The conference provided a multidisciplinary platform with a focus on i the influence of natural and anthropogenic factors on the geosphere geomechanical systems and anthropogenic objects found in a subcritical state and ii the influence of these factors on the system atmosphere ionosphere The problems considered in the book may be interesting for a wide audience including students professionals researches and for the industry

Physical and Mathematical Modeling of Earth and Environment Processes (2018) V. I. Karev, Dmitry Klimov, Konstantin Pokazeev, 2019-03-24 This book entitled Physical and Mathematical Modeling of Earth and Environment Processes is the result of a collaborative work after the 4th international scientific youth forum held at the IPMech RAS on November 13 2018 The book includes theoretical and experimental studies of processes in the atmosphere oceans the lithosphere and their interaction environmental issues problems of human impact on the environment methods of geophysical research A special focus is given to the extraction of hydrocarbon resources including unconventional sources This book also focuses on new approaches to the development of hydrocarbon fields very important in today's geopolitical conditions The book presents new results of the experimental and theoretical modeling of deformation fracture and filtration processes in the rocks in connection with issues of creating scientific fundamentals for new hydrocarbon production technologies

Selected Topics of Computational and Experimental Fluid Mechanics Jaime Klapp, Gerardo Ruíz Chavarría, Abraham Medina Ovando, Abel López Villa, Leonardo Di G. Sigalotti, 2015-03-05 This book contains invited lectures and selected contributions presented at the Enzo Levi and XIX Annual Meeting of the Fluid Dynamic Division of the Mexican Physical

Society in 2013 It is aimed at fourth year undergraduate and graduate students and scientists in the fields of physics engineering and chemistry who are interested in fluid dynamics from an experimental and theoretical point of view The invited lectures are introductory and avoid the use of complicated mathematics The fluid dynamics applications include multiphase flow convection diffusion heat transfer rheology granular material viscous flow porous media flow geophysics and astrophysics The material contained in the book includes recent advances in experimental and theoretical fluid dynamics and is suitable for both teaching and research

Unconventional Tight Reservoir Simulation: Theory, Technology and Practice Qiquan Ran,2020-08-14 This book systematically introduces readers to the simulation theory and techniques of multiple media for unconventional tight reservoirs It summarizes the macro microscopic heterogeneities the features of multiscale multiple media the characteristics of complex fluid properties the occurrence state of continental tight oil and gas reservoirs in China and the complex flow characteristics and coupled production mechanism under unconventional development patterns It also discusses the simulation theory of multiple media for unconventional tight oil and gas reservoirs mathematic model of flow through discontinuous multiple media geological modeling of discrete multiscale multiple media and the simulation of multiscale multiphase flow regimes and multiple media In addition to the practical application of simulation and software for unconventional tight oil and gas it also explores the development trends and prospects of simulation technology The book is of interest to scientific researchers and technicians engaged in the development of oil and gas reservoirs and serves as a reference resource for advanced graduate students in fields related to petroleum

Structurally Complex Reservoirs S. J. Jolley,2007

Poromechanics J.F. Thimus,et al,2020-12-18 This text features 105 papers dealing with the fundamentals and the applications of poromechanics from the Biot conference of 1998 held in Louvain la Neuve Topics include wave propagation numerical modelling identification of poromechanical parameters and constitutive modelling

Quantitative Methods in Reservoir Engineering Wilson C Chin,2016-10-01 Quantitative Methods in Reservoir Engineering Second Edition brings together the critical aspects of the industry to create more accurate models and better financial forecasts for oil and gas assets Updated to cover more practical applications related to intelligent infill drilling optimized well pattern arrangement water flooding with modern wells and multiphase flow this new edition helps reservoir engineers better lay the mathematical foundations for analytical or semi analytical methods in today s more difficult reservoir engineering applications Authored by a worldwide expert on computational flow modeling this reference integrates current mathematical methods to aid in understanding more complex well systems and ultimately guides the engineer to choose the most profitable well path The book delivers a valuable tool that will keep reservoir engineers up to speed in this fast paced sector of the oil and gas market Stay competitive with new content on unconventional reservoir simulation Get updated with new material on formation testing and flow simulation for complex well systems and paths Apply methods derived from real world case studies and calculation examples

Energy Research Abstracts ,1995

Fracture and In-situ Stress Characterization of

Hydrocarbon Reservoirs Geological Society of London, 2003

Applied Mechanics Reviews , 1982

Unveiling the Magic of Words: A Review of "**Multiphase Fluid Flow In Porous And Fractured Reservoirs**"

In some sort of defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their ability to kindle emotions, provoke contemplation, and ignite transformative change is actually awe-inspiring. Enter the realm of "**Multiphase Fluid Flow In Porous And Fractured Reservoirs**," a mesmerizing literary masterpiece penned with a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve in to the book is central themes, examine its distinctive writing style, and assess its profound impact on the souls of its readers.

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Table of Contents Multiphase Fluid Flow In Porous And Fractured Reservoirs

1. Understanding the eBook Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - The Rise of Digital Reading Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Advantages of eBooks Over Traditional Books
2. Identifying Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - User-Friendly Interface
4. Exploring eBook Recommendations from Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Personalized Recommendations
 - Multiphase Fluid Flow In Porous And Fractured Reservoirs User Reviews and Ratings
 - Multiphase Fluid Flow In Porous And Fractured Reservoirs and Bestseller Lists

5. Accessing Multiphase Fluid Flow In Porous And Fractured Reservoirs Free and Paid eBooks
 - Multiphase Fluid Flow In Porous And Fractured Reservoirs Public Domain eBooks
 - Multiphase Fluid Flow In Porous And Fractured Reservoirs eBook Subscription Services
 - Multiphase Fluid Flow In Porous And Fractured Reservoirs Budget-Friendly Options
6. Navigating Multiphase Fluid Flow In Porous And Fractured Reservoirs eBook Formats
 - ePub, PDF, MOBI, and More
 - Multiphase Fluid Flow In Porous And Fractured Reservoirs Compatibility with Devices
 - Multiphase Fluid Flow In Porous And Fractured Reservoirs Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Highlighting and Note-Taking Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Interactive Elements Multiphase Fluid Flow In Porous And Fractured Reservoirs
8. Staying Engaged with Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Multiphase Fluid Flow In Porous And Fractured Reservoirs
9. Balancing eBooks and Physical Books Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Multiphase Fluid Flow In Porous And Fractured Reservoirs
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Setting Reading Goals Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Fact-Checking eBook Content of Multiphase Fluid Flow In Porous And Fractured Reservoirs
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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