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Petroleum Reservoir Simulation **An Introduction to Reservoir Simulation Using MATLAB/GNU Octave Production Performance Modeling of Sarkhoon Gas Condensate Reservoir Reservoir Simulation and Well Interference Shale Gas and Tight Oil Reservoir Simulation Geomechanics in Reservoir Simulation Principles of Applied Reservoir Simulation Reservoir Simulation - Problems and Solutions Advanced Petroleum Reservoir Simulation *Multiphase Fluid Flow in Porous and Fractured Reservoirs* Reservoir Development Flash Computation and EoS Modelling for Compositional Thermal Simulation of Flow in Porous Media *Carbonate Reservoir Characterization: A Geologic-Engineering Analysis* International Conference on Artificial Intelligence for Smart Community Developing and Managing a Comprehensive Reservoir Analysis Model *New Techniques for Reduced-order Modeling in Reservoir Simulation* Essentials of Reservoir ... Embedded Discrete Fracture Modeling and Application in Reservoir Simulation Proceedings of the 7th International Conference on Advances in Energy Research Soft Computing and Intelligent Data Analysis in Oil Exploration *U.S. Geological Survey Professional Paper* Petroleum Software Directory *Modeling of Co2 Injection in Gas Condensate Reservoirs The challenge and opportunity of CCUS in the development of unconventional resource* Reservoir Engineering *Stratigraphic Reservoir Characterization for Petroleum Geologists, Geophysicists, and Engineers Unconventional Tight Reservoir Simulation: Theory, Technology and Practice* Fractured Vuggy Carbonate Reservoir Simulation Proceedings of the International Field Exploration and Development Conference 2019 Fracture and In-situ Stress Characterization of Hydrocarbon Reservoirs Hydraulic Fracture Modeling Fundamentals of Gas Shale Reservoirs The Petroleum Industry: Vertical integration Hearings, Reports and Prints of the Senate Committee on the Judiciary *Carbonate Reservoir Characterization: A Geologic-Engineering Analysis* *Water-resources Investigations Report North Sea Oil and Gas Reservoirs—II* SPE Reservoir Evaluation & Engineering Advances in the Geological Storage of Carbon Dioxide Clastic Hydrocarbon Reservoir Sedimentology**

Clastic Hydrocarbon Reservoir Sedimentology Dec 19 2019 This book presents a comprehensive assessment of clastic sedimentology and its application to reservoir geology. It covers the theoretical foundations of the topic and its use for scientists as well as professionals in the field. Further, it addresses all aspects of reservoir sedimentology, clastic sequence stratigraphy, sedimentation, reservoir diagenesis and heterogeneity, as well as depositional systems (alluvial, fluvial, lacustrine, delta, sandy coast, neritic, deep-water) in detail. The research team responsible for this book has been investigating clastic sedimentology for more than three decades and consists of highly published and cited authors. The Chinese edition of this book has been a great success, and is popular among sedimentologists and petroleum geologists alike.

Reservoir Development Jun 17 2022 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

Petroleum Software Directory Jul 06 2021

Geomechanics in Reservoir Simulation Nov 22 2022

Carbonate Reservoir Characterization: A Geologic-Engineering Analysis **Apr 15 2022 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.

Fracture and In-situ Stress Characterization of Hydrocarbon Reservoirs Oct 29 2020

***Modeling of Co2 Injection in Gas Condensate Reservoirs* Jun 05 2021 Gas condensate reservoir has been demonstrated as a highly complex phase and flow properties as a result of the appearance of condensate blockage near the well-bore region. This challenge can cause a significant reduction of well productivity and even seized due to decrease in pressure around the well-bore. The reduction in the reservoir pressure could be treated by shutting in the well for a period in order to build-up the reservoir pressure. Likewise, injection fluids are preferably used to maintain the reservoir pressure above dew point to avoid retrograde condensation which can result in condensate blockage. An accurate prediction should be made to achieve informed and resourceful decisions of reservoir management and sustain well productivity. In this report, the improved productivity of hydrocarbon and maintaining the reservoir pressure of a gas condensate reservoir under water, carbon dioxide and water followed by CO2 injections were studied using ECLIPSE 300 compositional reservoir simulator for 1D, 2D and 3D models.**

Shale Gas and Tight Oil Reservoir Simulation Dec 23 2022 Shale Gas and Tight Oil Reservoir Simulation delivers the latest research and applications used to better manage and interpret simulating production from shale gas and tight oil reservoirs. Starting with basic fundamentals, the book then includes real field data that will not only generate reliable reserve estimation, but also predict the effective range of reservoir and fracture properties through multiple history matching solutions. Also included are new insights into the numerical modelling of CO2 injection for enhanced oil recovery in tight oil reservoirs. This information is critical for a better understanding of the impacts of key reservoir properties and complex fractures. Models the well performance of shale gas and tight oil reservoirs with complex fracture geometries Teaches how to perform sensitivity studies, history matching, production forecasts, and economic optimization for shale-gas and tight-oil reservoirs Helps readers investigate data mining techniques, including the introduction of nonparametric smoothing models

***Water-resources Investigations Report* Apr 22 2020**

Developing and Managing a Comprehensive Reservoir Analysis Model Feb 13 2022 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).

***U.S. Geological Survey Professional Paper* Aug 07 2021**

Hearings, Reports and Prints of the Senate Committee on the Judiciary Jun 24 2020

Proceedings of the International Field Exploration and Development Conference 2019 Nov 29 2020 This book gathers selected papers from the 8th International Field Exploration and Development Conference (IFEDC 2019) and addresses a broad range of topics, including: Low Permeability Reservoir, Unconventional Tight & Shale Oil Reservoir, Unconventional Heavy Oil and Coal Bed Gas, Digital and Intelligent Oilfield, Reservoir Dynamic Analysis, Oil and Gas Reservoir Surveillance and Management, Oil and Gas Reservoir Evaluation and Modeling, Drilling and Production Operation, Enhancement of Recovery, Oil and Gas Reservoir Exploration. The conference not only provided a platform to exchange experiences, but also promoted the advancement of scientific research in oil & gas exploration and production. The book is chiefly intended for industry experts, professors, researchers, senior engineers, and enterprise managers.

***Petroleum Reservoir Simulation* Apr 27 2023 Petroleum Reservoir Simulation, Second Edition, introduces**

this novel engineering approach for petroleum reservoir modeling and operations simulations. Updated with new exercises, a new glossary and a new chapter on how to create the data to run a simulation, this comprehensive reference presents step-by-step numerical procedures in an easy to understand format. Packed with practical examples and guidelines, this updated edition continues to deliver an essential tool for all petroleum and reservoir engineers. Includes new exercises, a glossary and references Bridges research and practice with guidelines on introducing basic reservoir simulation parameters, such as history matching and decision tree content Helps readers apply knowledge with assistance on how to prepare data files to run a reservoir simulator

International Conference on Artificial Intelligence for Smart Community Mar 14 2022 This conference proceeding gather a selection of peer-reviewed papers presented at the 1st International Conference on Artificial Intelligence for Smart Community (AISC 2020), held as a virtual conference on 17–18 December 2020, with the theme Re-imagining Artificial Intelligence (AI) for Smart Community to apply computational intelligence for biomedical instruments, automation & control, and smart community to develop suitable solution for various real-world application. The conference virtually brought together researchers, scientists, engineers, industrial professionals, and students presenting important results in the related field of healthcare technology, soft computing technologies, IoT, evolutionary computations, automation and control, smart manufacturing and smart cities. Researchers and scientist working in the allied domain of Artificial Intelligence and others will find the book useful as it will contain some latest computational intelligence methodologies and applications.

***The challenge and opportunity of CCUS in the development of unconventional resource* May 04 2021**

Proceedings of the 7th International Conference on Advances in Energy Research Oct 09 2021 This book presents selected papers from the 7th International Conference on Advances in Energy Research (ICAER 2019), providing a comprehensive coverage encompassing all fields and aspects of energy in terms of generation, storage, and distribution. Themes such as optimization of energy systems, energy efficiency, economics, management, and policy, and the interlinkages between energy and environment are included. The contents of this book will be of use to researchers and policy makers alike.

SPE Reservoir Evaluation & Engineering Feb 19 2020

Fundamentals of Gas Shale Reservoirs Aug 27 2020 Provides comprehensive information about the key exploration, development and optimization concepts required for gas shale reservoirs Includes statistics about gas shale resources and countries that have shale gas potential Addresses the challenges that oil and gas industries may confront for gas shale reservoir exploration and development Introduces petrophysical analysis, rock physics, geomechanics and passive seismic methods for gas shale plays Details shale gas environmental issues and challenges, economic consideration for gas shale reservoirs Includes case studies of major producing gas shale formations

Reservoir Engineering Apr 03 2021 Reservoir Engineering focuses on the fundamental concepts related to the development of conventional and unconventional reservoirs and how these concepts are applied in the oil and gas industry to meet both economic and technical challenges. Written in easy to understand language, the book provides valuable information regarding present-day tools, techniques, and technologies and explains best practices on reservoir management and recovery approaches. Various reservoir workflow diagrams presented in the book provide a clear direction to meet the challenges of the profession. As most reservoir engineering decisions are based on reservoir simulation, a chapter is devoted to introduce the topic in lucid fashion. The addition of practical field case studies make Reservoir Engineering a valuable resource for reservoir engineers and other professionals in helping them implement a comprehensive plan to produce oil and gas based on reservoir modeling and economic analysis, execute a development plan, conduct reservoir surveillance on a continuous basis, evaluate reservoir performance, and apply corrective actions as necessary. Connects key reservoir fundamentals to modern engineering applications Bridges the conventional methods to the unconventional, showing the differences between the two processes Offers field case studies and workflow diagrams to help the reservoir professional and student develop and sharpen management skills for both conventional and unconventional reservoirs

An Introduction to Reservoir Simulation Using MATLAB/GNU Octave Mar 26 2023 Presents numerical methods for reservoir simulation, with efficient implementation and examples using widely-used online open-source code, for researchers, professionals and advanced students. This title is also available as Open Access on Cambridge Core.

Flash Computation and EoS Modelling for Compositional Thermal Simulation of Flow in Porous Media

May 16 2022 This book investigates a wide range of phase equilibrium modelling and calculation problems for compositional thermal simulation. Further, it provides an effective solution for multiphase isenthalpic flash under the classical framework, and it also presents a new flash calculation framework for multiphase systems, which can handle phase equilibrium and chemical reaction equilibrium simultaneously. The framework is particularly suitable for systems with many phases and reactions. In this book, the author shows how the new framework can be generalised for different flash specifications and different independent variables. Since the flash calculation is at the heart of various types of compositional simulation, the findings presented here will promote the combination of phase equilibrium and chemical equilibrium calculations in future simulators, aiming at improving their robustness and efficiency.

Advances in the Geological Storage of Carbon Dioxide Jan 20 2020 As is now generally accepted mankind's burning of fossil fuels has resulted in the mass transfer of greenhouse gases to the atmosphere, a modification of the delicately-balanced global carbon cycle, and a measurable change in world-wide temperatures and climate. Although not the most powerful greenhouse gas, carbon dioxide (CO) drives climate 2 change due to the enormous volumes of this gas pumped into the atmosphere every day. Produced in almost equal parts by the transportation, industrial and energy-generating sectors, atmospheric CO concentrations have 2 increased by about 50% over the last 300 years, and according to some sources are predicted to increase by up to 200% over pre-industrial levels during the next 100 years. If we are to reverse this trend, in order to prevent significant environmental change in the future, action must be taken immediately. While reduced use of fossil fuels (through conservation, increased efficiency and expanded use of renewable energy sources) must be our ultimate goal, short to medium term solutions are needed which can make an impact today. Various types of CO storage techniques have been proposed to fill this 2 need, with the injection of this gas into deep geological reservoirs being one of the most promising. For example this approach has the potential to become a closed loop system, whereby underground energy resources are brought to surface, their energy extracted (via burning or hydrogen extraction), and the resulting by-products returned to the subsurface.

Essentials of Reservoir ... Dec 11 2021 "The book covers the basic techniques of reservoir engineering necessary for a professional to master. The approach consists of starting from the fundamental physical laws down to the practical applications in reservoir engineering. Emphasis is placed on assumptions and limits attached to each concept and the link between theory and field applications. The theory in this book is developed with a homogenous unit system with useful formulas expressed in practical units."--BOOK JACKET.

Fractured Vuggy Carbonate Reservoir Simulation Dec 31 2020 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.

Hydraulic Fracture Modeling Sep 27 2020 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

Production Performance Modeling of Sarkhoon Gas Condensate Reservoir Feb 25 2023

The Petroleum Industry: Vertical integration Jul 26 2020

***Stratigraphic Reservoir Characterization for Petroleum Geologists, Geophysicists, and Engineers* Mar 02 2021 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. Practical resource describing different types of sandstone and shale reservoirs Case histories of reservoir studies for easy comparison Applications of standard, new, and emerging technologies**

***Multiphase Fluid Flow in Porous and Fractured Reservoirs* Jul 18 2022 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**

Reservoir Simulation - Problems and Solutions Sep 20 2022 Reservoir simulation has been in practice for more than 50 years, but it has recently gained significant momentum because of its wider application to the increasingly complex reservoir systems of today. Reservoir Simulation: Problems and Solutions provides petroleum engineers with extensive practice in the art of problem solving, strengthening their critical-thinking solution strategies and preparing them for the unique problems they will encounter in this dynamic field. Built on the fundamental concepts and solutions of the original exercises found in Basic Applied Reservoir Simulation (Turgay Ertekin, Jamal H. Abou-Kassem, and Gregory R. King), this new book provides an additional 180 exercises and solutions that fully illustrate the intricacies of reservoir-simulation methodology. Turgay Ertekin is Professor Emeritus of Petroleum and Natural Gas Engineering at the Pennsylvania State University, where he has been a member of the faculty for more than 40 years. Qian Sun is a research engineer at New Mexico Institute of Mining and Technology. His research focuses mainly on numerical reservoir simulation and artificial-intelligence applications in reservoir Engineering. Jian Zhang is a PhD graduate at Penn State. His research focuses on rate- and pressure-transient analysis, numerical reservoir simulation, artificial neural networks and neuro-simulation.

Reservoir Simulation and Well Interference Jan 24 2023 Co-written by a world-renowned petroleum engineer, this breakthrough new volume teaches engineers how to configure, place and produce horizontal and multilateral wells in geologically complicated reservoirs, select optimal well spacings and fracture separations, and how to manage factors influencing well productivity using proven cost-effective

and user-friendly simulation methods. Charged in the 1990s with solving some of petroleum engineering's biggest problems that the industry deemed "unsolvable," the authors of this innovative new volume solved those problems, not just using a well-published math model, but one optimized to run rapidly, the first time, every time. This not only provides numerical output, but production curves and color pressure plots automatically. And each in a single hour of desk time. Using their Multisim software that is featured in this volume, secondary school students at the Aldine Independent School District delivered professional quality simulations in a training program funded by some of the largest energy companies in the world. Think what you, as a professional engineer, could do in your daily work. Valuable with or without the software, this volume is the cutting-edge of reservoir engineering today, prefacing each chapter with a "trade journal summary" followed by hands-on details, allowing readers to replicate and extend results for their own applications. This volume covers parent-child, multilateral well, and fracture flow interactions, reservoir flow analysis, many other issues involving fluid flow, fracturing, and many other common "unsolvable" problems that engineers encounter every day. It is a must-have for every engineer's bookshelf.

Advanced Petroleum Reservoir Simulation Aug 19 2022 This second edition of the original volume adds significant new innovations for revolutionizing the processes and methods used in petroleum reservoir simulations. With the advent of shale drilling, hydraulic fracturing, and underbalanced drilling has come a virtual renaissance of scientific methodologies in the oil and gas industry. New ways of thinking are being pioneered, and Dr. Islam and his team have, for years now, been at the forefront of these important changes. This book clarifies the underlying mathematics and physics behind reservoir simulation and makes it easy to have a range of simulation results along with their respective probability. This makes the risk analysis based on knowledge rather than guess work. The book offers by far the strongest tool for engineers and managers to back up reservoir simulation predictions with real science. The book adds transparency and ease to the process of reservoir simulation in way never witnessed before. Finally, No other book provides readers complete access to the 3D, 3-phase reservoir simulation software that is available with this text. A must-have for any reservoir engineer or petroleum engineer working upstream, whether in exploration, drilling, or production, this text is also a valuable textbook for advanced students and graduate students in petroleum or chemical engineering departments.

***Carbonate Reservoir Characterization: A Geologic-Engineering Analysis* May 24 2020 This book integrates those critical geologic aspects of reservoir formation and occurrence with engineering aspects of reservoirs, and presents a comprehensive treatment of the geometry, porosity and permeability evolution, and producing characteristics of carbonate reservoirs. The three major themes discussed are: • the geometry of carbonate reservoirs and relationship to original depositional facies distributions • the origin and types of porosity and permeability systems in carbonate reservoirs and their relationship to post-depositional diagenesis • the relationship between depositional and diagenetic facies and producing characteristics of carbonate reservoirs, and the synergistic geologic-engineering approach to the exploitation of carbonate reservoirs. The intention of the volume is to fully aquaint professional petroleum geologists and engineers with an integrated geologic and engineering approach to the subject. As such, it presents a unique critical appraisal of the complex parameters that affect the recovery of hydrocarbon resources from carbonate rocks. The book may also be used as a text in petroleum geology and engineering courses at the advanced undergraduate and graduate levels.**

Soft Computing and Intelligent Data Analysis in Oil Exploration Sep 08 2021 This comprehensive book highlights soft computing and geostatistics applications in hydrocarbon exploration and production, combining practical and theoretical aspects. It spans a wide spectrum of applications in the oil industry, crossing many discipline boundaries such as geophysics, geology, petrophysics and reservoir engineering. It is complemented by several tutorial chapters on fuzzy logic, neural networks and genetic algorithms and geostatistics to introduce these concepts to the uninitiated. The application areas include prediction of reservoir properties (porosity, sand thickness, lithology, fluid), seismic processing, seismic and bio stratigraphy, time lapse seismic and core analysis. There is a good balance between introducing soft computing and geostatistics methodologies that are not routinely used in the petroleum industry and various applications areas. The book can be used by many practitioners such as processing geophysicists, seismic interpreters, geologists, reservoir engineers, petrophysicist, geostatistians, asset mangers and technology application professionals. It will also be of interest to academics to assess the importance of, and contribute to, R&D efforts in relevant areas.

***Unconventional Tight Reservoir Simulation: Theory, Technology and Practice* Feb 01 2021 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.

Principles of Applied Reservoir Simulation Oct 21 2022 The hottest, most important topic to reservoir engineers is reservoir simulation. Reservoir simulations are literally pictures of what a reservoir of oil or gas looks, or should look, like under the surface of the earth. A multitude of tools is available to the engineer to generate these pictures, and, essentially, the more accurate the picture, the easier the engineer can get the product out of the ground, and, thus, the more profitable the well will be. Completely revised and updated throughout, this new edition of a GPP industry standard has completely new sections on coalbed methane, CO2 sequestration (important for environmental concerns), Co2 Flood, more sophisticated petrophysical models for geoscientists, examples of subsidence, additional geomechanical calculations, and much more. What makes this book so different and valuable to the engineer is the accompanying software, used by reservoir engineers all over the world every day. The new software, IFLO (replacing WINB4D, in previous editions), is a simulator that the engineer can easily install in a Windows operating environment. IFLO generates simulations of how the well can be tapped and feeds this to the engineer in dynamic 3D perspective. This completely new software is much more functional, with better graphics and more scenarios from which the engineer can generate simulations. This book and software helps the reservoir engineer do his or her job on a daily basis, better, more economically, and more efficiently. Without simulations, the reservoir engineer would not be able to do his or her job at all, and the technology available in this product is far superior to most companies' internal simulation software. It is also much less expensive ($89.95 versus hundreds or even thousands of dollars) than off-the-shelf packages available from independent software companies servicing the oil and gas industry. It is, however, just as, or more accurate than these overpriced competitors, having been created by a high-profile industry expert and having been used by engineers in the real world with successful and profitable results. This reference is THE industry standard to successfuly modelling reservoirs, obtaining maximum supply and profiting from oil and gas reservoirs Includes dowloadable software of the new IFLO reservoir simulation software, that can save your company thousands of dollars This edition has been updated to included new sections on environmentally important issues such as CO2 sequestration, coalbed methane, CO2 Flood The third edition also provides more sophisticated petrophysical models, examples of subsidence and additional geomechanical calculations

Embedded Discrete Fracture Modeling and Application in Reservoir Simulation Nov 10 2021 The development of naturally fractured reservoirs, especially shale gas and tight oil reservoirs, exploded in recent years due to advanced drilling and fracturing techniques. However, complex fracture geometries such as irregular fracture networks and non-planar fractures are often generated, especially in the presence of natural fractures. Accurate modelling of production from reservoirs with such geometries is challenging. Therefore, Embedded Discrete Fracture Modeling and Application in Reservoir Simulation demonstrates how production from reservoirs with complex fracture geometries can be modelled efficiently and effectively. This volume presents a conventional numerical model to handle simple and complex fractures using local grid refinement (LGR) and unstructured gridding. Moreover, it introduces an Embedded Discrete Fracture Model (EDFM) to efficiently deal with complex fractures by dividing the fractures into segments using matrix cell boundaries and creating non-neighboring connections (NNCs). A basic EDFM approach using Cartesian grids and advanced EDFM approach using Corner point and unstructured grids will be covered. Embedded Discrete Fracture Modeling and Application in Reservoir Simulation is an essential reference for anyone interested in performing reservoir simulation of conventional and unconventional fractured reservoirs. Highlights the current state-of-the-art in reservoir simulation of unconventional reservoirs Offers understanding of the impacts of key reservoir properties

and complex fractures on well performance Provides case studies to show how to use the EDFM method for different needs

New Techniques for Reduced-order Modeling in Reservoir Simulation **Jan 12 2022 Reservoir simulation is widely applied for the management of oil and gas production and CO2 storage operations. It can be computationally expensive, however, particularly when the flow physics is complicated and many simulation runs must be performed. This has motivated the development of reduced-order modeling (ROM) procedures, where the goal is to achieve high degrees of computational speedup along with reasonable solution accuracy. In this work we develop and apply two types of ROM methods -- one based on proper orthogonal decomposition (POD) and piecewise linearization, and one based on deep learning. We first develop a POD-based ROM, referred to as POD-TPWL, to simulate coupled flow-geomechanics problems. In POD-TPWL, proper orthogonal decomposition, which enables the representation of solution unknowns in a low-dimensional subspace, is combined with trajectory piecewise linearization (TPWL), where solutions with new sets of well controls are represented via linearization around previously simulated (training) solutions. The over-determined system of equations is projected into the low-dimensional subspace using a least-squares Petrov-Galerkin procedure. The states and derivative matrices required by POD-TPWL, generated by an extended version of Stanford's Automatic-Differentiation-based General Purpose Research Simulator, are provided in an offline (pre-processing or training) step. Offline computational requirements correspond to the equivalent of 5-8 full-order simulations, depending on the number of training runs used. Runtime (online) speedups of O(100) or more are achieved for new POD-TPWL test-case simulations. The POD-TPWL model is tested extensively for a 2D coupled problem involving oil-water flow and geomechanics. It is shown that POD-TPWL provides predictions of reasonable accuracy, relative to full-order simulations, for well-rate quantities, global pressure and saturation fields, global maximum and minimum principal stress fields, and the Mohr-Coulomb rock failure criterion, for the cases considered. A systematic study of POD-TPWL error is conducted using various training procedures for different levels of perturbation between test and training cases. The use of randomness in the well bottom-hole pressure profiles used in training is shown to be beneficial in terms of POD-TPWL solution accuracy. The procedure is also successfully applied to a prototype 3D example case. We next apply the POD-TPWL reduced-order modeling framework to simulate and optimize the injection stage of CO2 storage operations. The use of multiple derivatives, meaning that the linearizations are performed around different training solutions at different time steps, is described and assessed. Two example cases are presented, and the ability of the POD-TPWL model to accurately capture bottom-hole pressure, when time-varying CO2 injection rates are prescribed, is demonstrated. It is also shown that, for these examples, the reduced-order models can provide accurate estimates of CO2 molar fraction at particular locations in the domain. The POD-TPWL model is then incorporated into a mesh adaptive direct search optimization framework where the objective is to minimize the amount of CO2 reaching a target layer at the end of the injection period. The POD-TPWL model is shown to be well suited for this purpose and to provide optimization results that are comparable to those obtained using full-order simulations. POD-TPWL preprocessing computations entail a (serial) time equivalent of about 6.7 full-order simulations, though the resulting runtime speedups, relative to full-order simulation, are about 100--150 for the cases considered. Finally, we develop a new deep-learning-based ROM for reservoir simulation. The reduced-order model is based on an existing embed-to-control (E2C) framework and includes an auto-encoder, which projects the system to a low-dimensional subspace, and a linear transition model, which approximates the evolution of the system states in low dimension. In addition to the loss function for data mismatch considered in the original E2C framework, we introduce a physics-based loss function that penalizes predictions that are inconsistent with the governing flow equations. The loss function is also modified to emphasize accuracy in key well quantities of interest (e.g., fluid production rates). The E2C ROM is shown to have interesting parallels with POD-TPWL. The new ROM is applied to oil-water flow in a 2D heterogeneous reservoir. A total of 300 high-fidelity training simulations are performed in the offline stage, and the network training requires 10-12~minutes on a Tesla V100 GPU node. Online (runtime) computations achieve speedups of O(1000) relative to full-order simulations. Extensive test case results, with well controls varied over large ranges, are presented. Accurate ROM predictions are achieved for global saturation and pressure fields at particular times, and for injection and production well responses as a function of time. Error is shown to increase when 100 or 200 (rather than 300) training runs are used to construct the E2C ROM.**

North Sea Oil and Gas Reservoirs—II **Mar 22 2020 The first North Sea Oil and Gas Reservoirs Conference**

was held in Trondheim in 1985 as part of the Norwegian Institute of Technology's 75th anniversary celebrations. Favourable reactions from the delegates prompted the Committee to re-run the event some three and a half years later, and it is now intended that the Confe rence be held on a regular basis as long as there is a demand for this type of gathering. The objectives of the 1989 Conference, which were broadly similar to those of the previous one, were: (a) to bring together those engaged in various geoscientific and reservoir engineering aspects of North Sea Oil and gas reservoirs in one forum; (b) to demonstrate wherever poSsible the interdependence of the various disciplines and specializations; (c) to promote innovative, synergistic approaches to research and development programmes aimed at North Sea conditions; and (d) to reflect current trends in the reservoir sciences. Naturally there was no place for specialist parallel sessions in a Conference aimed at encouraging interdisciplinary integration and awareness.