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Applied Petroleum Reservoir Engineering

Basic level textbook covering concepts and practical analytical techniques of reservoir engineering.

Applied Petroleum Reservoir Engineering

The Definitive Guide to Petroleum Reservoir Engineering–Now Fully Updated to Reflect New Technologies and Easier Calculation Methods Craft and Hawkins' classic introduction to petroleum reservoir engineering is now fully updated for new technologies and methods, preparing students and practitioners to succeed in the modern industry. In Applied Petroleum Reservoir Engineering, Third Edition, renowned expert Ronald E. Terry and project engineer J. Brandon Rogers review the history of reservoir engineering, define key terms, carefully introduce the material balance approach, and show how to apply it with many types of reservoirs. Next, they introduce key principles of fluid flow, water influx, and advanced recovery (including hydrofracturing). Throughout, they present field examples demonstrating the use of material balance and history matching to predict reservoir performance. For the first time, this edition relies on Microsoft Excel with VBA to make calculations easier and more intuitive. This edition features Extensive updates to reflect modern practices and technologies, including gas condensate reservoirs, water flooding, and enhanced oil recovery Clearer, more complete introductions to vocabulary and concepts– including a more extensive glossary Several complete application examples, including single-phase gas, gas-condensate, undersaturated oil, and saturated oil reservoirs Calculation examples using Microsoft Excel with VBA throughout Many new example and practice problems using actual well data A revamped history-matching case study project that integrates key topics and asks readers to predict future well production

Solutions Of Applied Petroleum Reservoir Engineering Problems (Craft)

The most current, applied book for petroleum engineers, geologists and others working in the development and production of oil and gas fields, Craft and Hawkins textbook (Second edition) reflects the advances made in reservoir engineering calculation techniques. Numerous real world examples clarify the material, providing the reservoir engineer with the practical information to make applied calculations. The current textbook presents solutions of applied petroleum reservoir engineering problems. It aids petroleum professionals and those concerned with the calculation of initial oil and gas in place, oil and gas recovery from different reservoirs, recovery factor of different types of reservoirs, material balance equations and their applications in petroleum engineering, and water influx.

Applied Petroleum Reservoir Engineering

This book presents many real field examples demonstrating the use of material balance and history matching to predict reservoir performance. For the first time, this edition uses Microsoft Excel with VBA as its calculation tool, making calculations far easier and more intuitive for today's readers. Beginning with an introduction of key terms, detailed coverage of the material balance approach, and progressing through the principles of fluid flow, water influx, and advanced recovery techniques, this book will be an asset to students without prior exposure to petroleum engineering with this text updated to reflect modern industrial practice.

Petroleum Engineering

The need for this book has arisen from demand for a current text from our students in Petroleum Engineering at Imperial College and from post-experience Short Course students. It is, however, hoped that the material will also be of more general use to practising petroleum engineers and those wishing for aa introduction into the specialist literature. The book is arranged to provide both background and overview into many facets of petroleum engineering, particularly as practised in the offshore environments of North West Europe. The material is largely based on the authors' experience as teachers and consultants and is supplemented by worked problems where they are believed to enhance understanding. The authors would like to express their sincere thanks and appreciation to all the people who have helped in the preparation of this book by technical comment and discussion and by giving permission to reproduce material. In particular we would like to thank our present colleagues and students at Imperial College and at ERC Energy Resource Consultants Ltd. for their stimulating company, Jill and Janel for typing seemingly endless manuscripts; Dan Smith at Graham and Trotman Ltd. for his perseverence and optimism; and Lesley and Joan for believing that one day things would return to normality. John S. Archer and Colin G. Wall 1986 ix Foreword Petroleum engineering has developed as an area of study only over the present century. It now provides the technical basis for the exploitation of petroleum fluids in subsurface sedimentary rock reservoirs.

Simulations Across Diverse Scales in Petroleum Systems

Simulations Across Diverse Scales in Petroleum Systems: From Rock Pores to Reservoirs discusses the known limitations and potential solutions for the next generation multiscale simulation tools needed for engineers to make progress toward system-level multiscale approaches in solving oil and gas formation flows. Researchers and engineers working in the oil and gas industries today are looking for more confidence in their numerical simulations to reliably forecast the lifespan of oil and gas entrapped in formations, estimate the cost of production and predict the associated risks involved in safely extracting oil and gas. Currently, numerical approaches involve a lot of assumptions and have a large margin of error, and it is not possible to capture all the scales of geometry and physics in one single simulation. This book explains the progression of how to capture each scale of geometry and physics in numerical simulations, classifying oil and gas flow through porous formation into three scales: pore scale to capture microscopic effect when fluid is flowing through the gaps in rocks and fractures, near wellbore scale to capture intermediate range where multiphase flow through the porous zone is used to calculate viscous and inertial effects, and reservoir scale simulations to model miles-long domain using Darcy-type models. The book helps oil and gas engineers understand all the tools available to model today's oil and gas applications. It features additional content on uncertainty quantification, coupling and multiscale information to help explain how to further integrate between the scales, as well as the outlook for the next-generation petroleum systems simulator. Helps oil and gas engineers understand all the tools available to model today's oil and gas applications Includes equations, tools and discussion of the progression of each scale simulation, from small pores to large reservoirs Explains how to decrease

model uncertainty with data, parameters and boundary conditions Describes how to create robust and efficient numerical simulation methods involving integration on different scales of modeling

Introduction to Petroleum Engineering

Presents key concepts and terminology for a multidisciplinary range of topics in petroleum engineering Places oil and gas production in the global energy context Introduces all of the key concepts that are needed to understand oil and gas production from exploration through abandonment Reviews fundamental terminology and concepts from geology, geophysics, petrophysics, drilling, production and reservoir engineering Includes many worked practical examples within each chapter and exercises at the end of each chapter highlight and reinforce material in the chapter Includes a solutions manual for academic adopters

Theory, Measurement, and Interpretation of Well Logs

An indispensable tool, Theory, Measurement and Interpretation of Well Logs introduces the three primary phases of well-logging technology to engineering and geosciences students. This text offers an in-depth study of the electric, radioactive, and acoustic properties of sedimentary rocks. Mathematical and empirical models relate a formation property of interest to the property measured with the logging tool. Openhole logging techniques are covered, along with concepts of traditional and modern tools. ADDITIONAL RESOURSES: You may want to consider this related SPE training course: Well Log Interpretation Essentials

Environmental Control in Petroleum Engineering

The petroleum industry must minimize the environmental impact of its various operations. This extensively researched book assembles a tremendous amount of practical information to help reduce and control the environmental consequences of producing and processing petroleum and natural gas. The best way to treat pollution is not to create it in the first place. This book shows you how to plan and manage production activities to minimize and even eliminate some environmental problems without severely disrupting operations. It focuses on ways to treat drilling and production wastes to reduce toxicity and/or volume before their ultimate disposal. You'll also find methods for safely transporting toxic materials from the upstream petroleum industry away from their release sites. For those sites already contaminated with petroleum wastes, this book reviews the remedial technologies available. Other topics include United States federal environmental regulations, sensitive habitats, major U.S. chemical waste exchanges, and offshore releases of oil. Environmental Control in Petroleum Engineering is essential for industry personnel with little or no training in environmental issues as well as petroleum engineering students.

Rules of Thumb for Petroleum Engineers

Finally, there is a one-stop reference book for the petroleum engineer which offers practical, easy-to-understand responses to complicated technical questions. This is a must-have for any engineer or non-engineer working in the petroleum industry, anyone studying petroleum engineering, or any reference library. Written by one of the most well-known and prolific petroleum engineering writers who has ever lived, this modern classic is sure to become a staple of any engineer’s library and a handy reference in the field. Whether open on your desk, on the hood of your truck at the well, or on an offshore platform, this is the only book available that covers the petroleum engineer’s rules of thumb that have been compiled over decades. Some of these “rules,” until now, have been “unspoken but everyone knows,” while others are meant to help guide the engineer through some of the more recent breakthroughs in the industry’s technology, such as hydraulic fracturing and enhanced oil recovery. The book covers every aspect of crude oil, natural gas, refining, recovery, and any other area of petroleum engineering that is useful for the engineer to know or to be able to refer to, offering practical solutions to everyday engineering problems and a comprehensive reference work that will stand the test of time and provide aid to its readers. If there is only one reference work you buy in petroleum engineering, this is it.

Petroleum Engineering Handbook

"Volume VI, Emerging and peripheral technologies" covers technologies that have come to the forefront of the industry in the past twenty years. Developments that are on the periphery of the areas covered in the first five volumes or in emerging areas of technology are covered in this volume.

Petroleum Engineering Handbook

Volume 1 of this book dealt with the techniques behind the acquisition, processing and interpretation of basic reservoir data. This second vol ume is devoted to the study, verification and prediction of reservoir behaviour, and methods of increasing productivity and oil recovery. I should like to bring a few points to the reader's attention. Firstly, the treatment of immiscible displacement by the method of characteristics. The advantage of this approach is that it brings into evidence the various physical aspects of the process, especially its dependence on the properties of the fluids concerned, and on the velocity of displacement. It was not until after the publication of the first, Italian, edition of this book (February 1990) that I discovered a similar treatment in the book Enhanced Oil Recovery, by Larry W. Lake, published in 1989. Another topic that I should like to bring to the reader's attention is the forecasting of reservoir behaviour by the method of identified models. This original contribution to reservoir engineering is based on systems theory - a science which should, in my opinion, find far wider applica tion, in view of the "black box" nature of reservoirs and their responses to production processes.

Principles of Petroleum Reservoir Engineering

Petroleum engineering now has its own true classic handbook that reflects the profession's status as a mature major engineering discipline. Formerly titled the Practical Petroleum Engineer's Handbook, by Joseph Zaba and W.T. Doherty (editors), this new, completely updated two-volume set is expanded and revised to give petroleum engineers a comprehensive source of industry standards and engineering practices. It is packed with the key, practical information and data that petroleum engineers rely upon daily. The result of a fifteen-year effort, this handbook covers the gamut of oil and gas engineering topics to provide a reliable source of engineering and reference information for analyzing and solving problems. It also reflects the growing role of natural gas in industrial development by integrating natural gas topics throughout both volumes. More than a dozen leading industry experts-academia and industry-contributed to this two-volume set to provide the best , most comprehensive source of petroleum engineering information available.

Standard Handbook of Petroleum and Natural Gas Engineering:

One of the fundamental aspects of petroleum exploitation and production is that of petroleum engineering, ie the assessment and recovery of oil from the various types of oil 'reservoirs'.The importance of effective petroleum engineering has increased dramatically due to a number or of varying reasons. Firstly, recoverable oil reserves should be capable of extended life by application of efficient reservoir depletion methods. Secondly, the average recovery factor does not appear to have increased over the last three decades. Thirdly, the behaviour of reservoirs is still unpredictable in spite of the fact that the principles of oil recovery are better understood. Finally, there has been an enormous growth in the number of computer-based analysis techniques available to the engineer. These factors, taken in conjunction with the fact that many developments have been presented as unpublished papers, have highlighted the need for a series of volumes which will give the engineer a starting point for the collection of up-to-date information.This new series of volumes, Developments in Petroleum Engineering, is intended to fill this gap and will contain reviews of recent developments. The chapters are written by specialists at a level which summarises the progress, but does not necessarily cover every facet and detail, of a particular subject. Rather, they direct the reader to the most useful of the original sources.

Developments in Petroleum Engineering 1

The main focus of this book is to show the challenges specific to shale hydrocarbon recovery and the practices to overcome these challenges. This book starts with an overview to the technological evolution that led to successful production of shale plays, and the implications of the shale being a source rock for its hydrocarbon recovery. The second chapter presents the operations of well drilling, hydraulic fracturing, and monitoring activities. Chapter 3 provides an overview of the available methods for reserve estimation of shale resources followed by comprehensive coverage of decline curve analysis (DCA). In a departure from the mostly empirical rate-time DCA methods covered in Chapter 3, advanced rate-time-pressure analysis – often referred to as rate transient analysis (RTA) -

methods are presented in Chapter 4. Chapter 4 ends with discussing the complications of fluid flow in shale reservoirs and the required modeling improvements.

Petroleum Engineering Handbook

The petroleum geologist and engineer must have a working knowledge of petrophysics in order to find oil reservoirs, devise the best plan for getting it out of the ground, then start drilling. This book offers the engineer and geologist a manual to accomplish these goals, providing much-needed calculations and formulas on fluid flow, rock properties, and many other topics that are encountered every day. New updated material covers topics that have emerged in the petrochemical industry since 1997. Contains information and calculations that the engineer or geologist must use in daily activities to find oil and devise a plan to get it out of the ground Filled with problems and solutions, perfect for use in undergraduate, graduate, or professional courses Covers real-life problems and cases for the practicing engineer

Shale Hydrocarbon Recovery

This first of two volumes provides a comprehensive overview of petroleum engineering. Created with the purpose of answering daily questions faced by the practicing petroleum engineer, it is suitable for field and office use.

Petroleum Engineering

Working Guide to Petroleum and Natural Gas Production Engineering provides an introduction to key concepts and processes in oil and gas production engineering. It begins by describing correlation and procedures for predicting the physical properties of natural gas and oil. These include compressibility factor and phase behavior, field sampling process and laboratory measurements, and prediction of a vapor-liquid mixture. The book discusses the basic parameters of multiphase fluid flow, various flow regimes, and multiphase flow models. It explains the natural flow performance of oil, gas, and the mixture. The final chapter covers the design, use, function, operation, and maintenance of oil and gas production facilities; the design and construction of separators; and oil and gas separation and treatment systems. Evaluate well inflow performance Guide to properties of hydrocarbon mixtures Evaluate Gas production and processing facilities

Advances in Petroleum Engineering

The need for this book has arisen from demand for a current text from our students in Petroleum Engineering at Imperial College and from post-experience Short Course students. It is, however, hoped that the material will also be of more general use to practising petroleum engineers and those wishing for aa introduction into the specialist literature. The book is arranged to provide both background and overview into many facets of petroleum engineering, particularly as practised in the offshore environments of North West Europe. The material is largely based on the authors' experience as teachers and consultants and is supplemented by worked problems where they are believed to enhance understanding. The authors would like to express their sincere thanks and appreciation to all the people who have helped in the preparation of this book by technical comment and discussion and by giving permission to reproduce material. In particular we would like to thank our present colleagues and students at Imperial College and at ERC Energy Resource Consultants Ltd. for their stimulating company, Jill and Janel for typing seemingly endless manuscripts; Dan Smith at Graham and Trotman Ltd. for his perseverence and optimism; and Lesley and Joan for believing that one day things would return to normality. John S. Archer and Colin G. Wall 1986 ix Foreword Petroleum engineering has developed as an area of study only over the present century. It now provides the technical basis for the exploitation of petroleum fluids in subsurface sedimentary rock reservoirs.

Petroleum Engineering

Oil and gas still power the bulk of our world, from automobiles and the power plants that supply electricity to our homes and businesses, to jet fuel, plastics, and many other products that enrich our lives. With the relatively recent development of hydraulic fracturing ("fracking"), multilateral, directional, and underbalanced drilling, and enhanced oil recovery, oil and gas production is more important and efficient than ever before. Along with these advancements, as with any new engineering process or technology, come challenges, many of them environmental. More than just a text that outlines

the environmental challenges of oil and gas production that have always been there, such as gas migration and corrosion, this groundbreaking new volume takes on the most up-to-date processes and technologies involved in this field. Filled with dozens of case studies and examples, the authors, two of the most well-known and respected petroleum engineers in the world, have outlined all of the major environmental aspects of oil and gas production and how to navigate them, achieving a more efficient, effective, and profitable operation. This groundbreaking volume is a must-have for any petroleum engineer working in the field, and for students and faculty in petroleum engineering departments worldwide.

Developments in Petroleum Engineering: Stability of tubulars. Deviation control

Advanced Reservoir Engineering offers the practicing engineer and engineering student a full description, with worked examples, of all of the kinds of reservoir engineering topics that the engineer will use in day-to-day activities. In an industry where there is often a lack of information, this timely volume gives a comprehensive account of the physics of reservoir engineering, a thorough knowledge of which is essential in the petroleum industry for the efficient recovery of hydrocarbons. Chapter one deals exclusively with the theory and practice of transient flow analysis and offers a brief but thorough hands-on guide to gas and oil well testing. Chapter two documents water influx models and their practical applications in conducting comprehensive field studies, widely used throughout the industry. Later chapters include unconventional gas reservoirs and the classical adaptations of the material balance equation. * An essential tool for the petroleum and reservoir engineer, offering information not available anywhere else * Introduces the reader to cutting-edge new developments in Type-Curve Analysis, unconventional gas reservoirs, and gas hydrates * Written by two of the industry's best-known and respected reservoir engineers

History of Petroleum Engineering

This new edition of the Standard Handbook of Petroleum and Natural Gas Engineering provides you with the best, state-of-the-art coverage for every aspect of petroleum and natural gas engineering. With thousands of illustrations and 1,600 information-packed pages, this text is a handy and valuable reference. Written by over a dozen leading industry experts and academics, the Standard Handbook of Petroleum and Natural Gas Engineering provides the best, most comprehensive source of petroleum engineering information available. Now in an easy-to-use single volume format, this classic is one of the true "must haves" in any petroleum or natural gas engineer's library. A classic for the oil and gas industry for over 65 years! A comprehensive source for the newest developments, advances, and procedures in the petrochemical industry, covering everything from drilling and production to the economics of the oil patch Everything you need - all the facts, data, equipment, performance, and principles of petroleum engineering, information not found anywhere else A desktop reference for all kinds of calculations, tables, and equations that engineers need on the rig or in the office A time and money saver on procedural and equipment alternatives, application techniques, and new approaches to problems

Petroleum Engineering Handbook, Volume 5

Reservoir engineering is a branch of petroleum engineering that applies scientific principles to the drainage problems arising during the development and production of oil and gas reservoirs so as to obtain a high economic recovery. The working tools of the reservoir engineer are subsurface geology, applied mathematics, and the basic laws of physics and chemistry governing the behaviour of liquid and vapour phases of crude oil, natural gas, and water in reservoir rock. Of particular interest to reservoir engineers is generating accurate reserves estimates for use in financial reporting to the SEC and other regulatory bodies. Other job responsibilities include numerical reservoir modelling, production forecasting, well testing, well drilling and workover planning, economic modelling, and PVT analysis of reservoir fluids.

Petrophysics

The field of engineering which deals with the activities related to the production of hydrocarbons is known as petroleum engineering. Such hydrocarbons include crude oil or natural gas. Its main goal is to maximize the economic recovery of hydrocarbons from subsurface reservoirs. Petroleum engineering estimates the recoverable volume of the hydrocarbon resource with the help of a thorough understanding of the physical behavior of the resources. Such resources are found at very high pressure within the porous rocks. Petroleum engineering assimilates the knowledge of various other fields such

as geophysics, petroleum geology, drilling, economics, formation evaluation, reservoir engineering, artificial lift systems, well engineering and petroleum production engineering. This textbook aims to shed light on some of the unexplored aspects of petroleum engineering. Most of the topics introduced in this book cover new techniques and the applications of this field. It is appropriate for those seeking detailed information in this area.

Petroleum Engineering Handbook for the Practicing Engineer

This book is an introduction to oil and gas designed to be both accessible to absolute beginners who know nothing about the subject, and at the same time interesting to people who work in one area (such as drilling or seismic exploration) and would like to know about other areas (such as production offshore, or how oil and gas were formed, or what can go wrong). It begins by discussing oil and gas in the broader context of human society, and goes on to examine what they consist of, how and where they were formed, how we find them, how we drill for them and how we measure them. It describes production onshore and offshore, and examines in detail some instructive mishaps, including some that are well known, such as Deepwater Horizon and Piper Alpha, and other lesser known incidents. It looks at recent developments, such as shale oil, and concludes with some speculation about the future. It includes many references for readers who would like to read further. Mathematical content is minimal.

Oil Reservoir Engineering

"Petroleum and natural gas still remain the single biggest resource for energy on earth; Even as alternative and renewable sources are developed, petroleum and natural gas continue to be, by far, the most used and, if engineered properly, the most cost-effective and efficient, source of energy on the planet; Drilling engineering is one of the most important links in the energy chain, being, after all, the science of getting the resources out of the ground for processing; Without drilling engineering, there would be no gasoline, jet fuel, and the myriad of other have to have products that people use all over the world every day; Following up on their previous books, also available from Wiley-Scrivener, the authors, two of the most well-respected, prolific, and progressive drilling engineers in the industry, offer this groundbreaking volume; They cover the basics tenets of drilling engineering, the most common problems that the drilling engineer faces day to day, and cutting-edge new technology and processes through their unique lens; Written to reflect the new, changing world that we live in, this fascinating new volume offers a treasure of knowledge for the veteran engineer, new hire, or student; This book is an excellent resource for petroleum engineering students, reservoir engineers, supervisors & managers, researchers and environmental engineers for planning every aspect of rig operations in the most sustainable, environmentally responsible manner, using the most up-to-date technological advancements in equipment and processes"--

Working Guide to Petroleum and Natural Gas Production Engineering

This second volume of Surface Operations in Petroleum Production complements and amplifies Volume I which appeared in 1987 and covered several aspects of oilfield technology. This second volume presents a detailed theoretical and practical exposition of surface oilfield practices, including gas flow rate measurement, cementing, fracturing, acidizing, and gravel packing. In today's era of specialization, these operations are generally left to service companies, denying field engineers and company managers direct detailed knowledge of the specific surface and subsurface operations. This book presents a comprehensive analysis which may be used by field engineers to analyze technical problems, specify the required surface and subsurface operations, and closely supervise the service company's work and post-treatment operation of the well. Another subject which has great economic consequences in all oilfields is corrosion of equipment. The book presents a comprehensive analysis of the theory of corrosion in the oilfield and methods that have proved effective for the retardation, or elimination, of corrosion. Quality control of injection waters in then covered. Three more topics are addressed: the first is offshore technology which is presented with reference to onshore oilfield operations, making a lucid presentation for field engineers who have no practical knowledge of the subject. The second is pollution control - an area of oilfield management which has assumed widespread importance in recent years. The last topic covered is the subject of underground storage of gas and oil. Underground fuel storage and retrieval is an active area of oilfield production management that utilizes the technology presented in this entire treatise. Finally, the technology of testing petroleum products and sample experiments for junior and senior petroleum engineering students are presented. This two-volume

comprehensive treatise on modern oilfield technology thus provides not only a complete reference for field managers, engineers, and technical consultants, but will also serve academic needs in advanced studies of petroleum production engineering.

Petroleum Engineering

Petroleum Engineering Handbook