

Enhanced Oil Recovery Field Case Studies

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Stratified Heterogeneous Reservoir Enhanced Oil Recovery in Shale and Tight Reservoirs Enhanced Oil Recovery, I

Carbon Capture, Utilization and Sequestration

Formation Damage during Improved Oil Recovery: Fundamentals and Applications bridges the gap between theoretical knowledge and field practice by presenting information on formation damage issues that arise during enhanced oil recovery. Multi-contributed technical chapters include sections on modeling and simulation, lab experiments, field case studies, and newly proposed technologies and methods that are related to formation damage during secondary and tertiary recovery processes in both conventional and unconventional reservoirs. Focusing on both the fundamental theories related to EOR and formation damage, this reference helps engineers formulate integrated and systematic designs for applying EOR processes while also considering formation damage issues. Presents the first complete reference addressing formation damage as a result of enhanced oil recovery Provides the mechanisms for formation damage issues that are coupled with EOR Suggests appropriate preventative actions or responses Delivers a structured approach on how to understand the fundamental theories, practical challenges and solutions

Primer on Enhanced Oil Recovery

Water flooding of oil reservoirs has been performed for a century in order to improve oil recovery for two reasons: (1) give pressure support to the reservoir to prevent gas production and (2) displace the oil by viscous forces. During the last 30 years, it was discovered that the wetting properties of the reservoir played a very important role for the efficiency of the water flood. Even though much work have been published on crude oil-brine-rock (CBR) interaction related to wetting properties, Professor N.R. Morrow, University of Wyoming, asked the audience the following question at the European enhanced oil-recovery (EOR) meeting in Cambridge, April 2011: Do we understand water flooding of oil reservoirs? If we are not able to explain why injection fluids of different ionic composition can have a great impact on displacement efficiency and oil recovery, the answer to Morrow's question is NO. Researchers have to admit that we do not know the phenomena of water flooding well enough. The key to improve our understanding is to obtain fundamental chemical understanding of the CBR interaction by controlled laboratory studies, and then propose chemical mechanisms, which should be validated also from field experience. In this chapter, I have tried to sum up our experience and chemical understanding on water-based EOR in carbonates and sandstones during the last 20 years with a specific focus on initial wetting properties and possibilities for wettability modification to optimize oil recovery. Chemically, the CBR interaction is completely different in carbonates and

sandstones. The proposed chemical mechanisms for wettability modification are used to explain field observations.

Reservoir Engineering

Fundamentals of Enhanced Oil and Gas Recovery from Conventional and Unconventional Reservoirs delivers the proper foundation on all types of currently utilized and upcoming enhanced oil recovery, including methods used in emerging unconventional reservoirs. Going beyond traditional secondary methods, this reference includes advanced water-based EOR methods which are becoming more popular due to CO₂ injection methods used in EOR and methods specific to target shale oil and gas activity. Rounding out with a chapter devoted to optimizing the application and economy of EOR methods, the book brings reservoir and petroleum engineers up-to-speed on the latest studies to apply. Enhanced oil recovery continues to grow in technology, and with ongoing unconventional reservoir activity underway, enhanced oil recovery methods of many kinds will continue to gain in studies and scientific advancements. Reservoir engineers currently have multiple outlets to gain knowledge and are in need of one product go-to reference. Explains enhanced oil recovery methods, focusing specifically on those used for unconventional reservoirs Includes real-world case studies and examples to further illustrate points Creates a practical and theoretical foundation with multiple contributors from various backgrounds Includes a full range of the latest and future

methods for enhanced oil recovery, including chemical, waterflooding, CO₂ injection and thermal

Fundamentals of Enhanced Oil and Gas Recovery from Conventional and Unconventional Reservoirs

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

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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

Enhanced Oil Recovery Field Case Studies

With regard to depleted oil and gas resources, increasing world energy demands and volatile economic and political world scenarios, oil and gas industry players are working very hard to find ways to cut exploration and production costs to sustain and develop the industry to provide the world with cheap energy without harming the environment. Therefore, this book intends to provide readers with a comprehensive overview of the current state of the art in drilling, such as advanced drilling operations and techniques used by the industry, particularly in floating, underbalanced drilling, smart drilling fluid, intelligent drilling, drilling optimization, and future drilling technology and development.

Geophysics and Geosequestration

Youth Technical Sessions Proceedings

This chapter first reviews the mechanisms, theories, and screening criteria of cyclic steam stimulation (CSS) projects. Then we will focus on the practice of CSS projects. Finally field cases are presented which include Cold Lake in Alberta, Canada, Midway Sunset in California, Du 66 block in the Liaohe Shuguang field, Jin 45 Block in the Liaohe Huanxiling field, Gudao Field, Blocks 97 and 98 in the Karamay field, and Gaosheng Field in China.

Chemical Enhanced Oil Recovery (cEOR)

Enhanced Oil Recovery Field Case Studies bridges the gap between theory and practice in a range of real-world EOR settings. Areas covered include steam and polymer flooding, use of foam, in situ combustion, microorganisms, "smart water"-based EOR in carbonates and sandstones, and many more. Oil industry professionals know that the key to a successful enhanced oil recovery project lies in anticipating the differences between plans and the realities found in the field. This book aids that effort, providing valuable case studies from more than 250 EOR pilot and field applications in a variety of oil fields. The case studies cover practical problems, underlying theoretical and modeling methods, operational parameters, solutions and sensitivity studies, and performance optimization strategies,

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benefitting academicians and oil company practitioners alike. Strikes an ideal balance between theory and practice Focuses on practical problems, underlying theoretical and modeling methods, and operational parameters Designed for technical professionals, covering the fundamental as well as the advanced aspects of EOR

Recent Insights in Petroleum Science and Engineering

Introduction to Enhanced Recovery Methods for Heavy Oil and Tar Sands, Second Edition, explores the importance of enhanced oil recovery (EOR) and how it has grown in recent years thanks to the increased need to locate unconventional resources such as heavy oil and shale. Unfortunately, petroleum engineers and managers aren't always well-versed in the enhancement methods that are available when needed or the most economically viable solution to maximize their reservoir's productivity. This revised new edition presents all the current methods of recovery available, including the pros and cons of each. Expanded and updated as a great preliminary text for the newcomer to the industry or subject matter, this must-have EOR guide teaches all the basics needed, including all thermal and non-thermal methods, along with discussions of viscosity, sampling, and the technologies surrounding offshore applications. Enables users to quickly learn how to choose the most efficient recovery method for their reservoir while evaluating economic conditions Presents the differences between each method of recovery

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with newly added real-world case studies from around the world Helps readers stay competitive with the growing need of extracting unconventional resources with new content on how these complex reservoirs interact with injected reservoir fluids

Carbon Dioxide Capture and Storage

Crude oil development and production in U.S. oil reservoirs can include up to three distinct phases: primary, secondary, and tertiary (or enhanced) recovery. During primary recovery, the natural pressure of the reservoir or gravity drive oil into the wellbore, combined with artificial lift techniques (such as pumps) which bring the oil to the surface. But only about 10 percent of a reservoir's original oil in place is typically produced during primary recovery. Secondary recovery techniques to the field's productive life generally by injecting water or gas to displace oil and drive it to a production wellbore, resulting in the recovery of 20 to 40 percent of the original oil in place. In the past two decades, major oil companies and research organizations have conducted extensive theoretical and laboratory EOR (enhanced oil recovery) researches, to include validating pilot and field trials relevant to much needed domestic commercial application, while western countries had terminated such endeavours almost completely due to low oil prices. In recent years, oil demand has soared and now these operations have become more desirable. This book is about the recent developments in the area as well as the technology for enhancing oil recovery. The book provides important case studies related to over

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one hundred EOR pilot and field applications in a variety of oil fields. These case studies focus on practical problems, underlying theoretical and modelling methods, operational parameters (e.g., injected chemical concentration, slug sizes, flooding schemes and well spacing), solutions and sensitivity studies, and performance optimization strategies. The book strikes an ideal balance between theory and practice, and would be invaluable to academicians and oil company practitioners alike. Updated chemical EOR fundamentals providing clear picture of fundamental concepts Practical cases with problems and solutions providing practical analogues and experiences Actual data regarding ranges of operation parameters providing initial design parameters Step-by-step calculation examples providing practical engineers with convenient procedures

ICIPEG 2016

An in-depth study of the fundamental aspects of enhanced oil recovery (EOR), this book brings together detailed analyses of proven techniques. It begins with the current theories of the origin of oil and ends with a treatise on waterflooding which is the basis of the majority of EOR processes. Two and three-phase relative permeability relationships are discussed since they form the basis for fluid flow processes in porous media. The advent of EOR has increased the need for a better understanding of three-phase flow because this has become an integral part of carbon dioxide and steam injection, yet is an area of experimental study that has

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been seriously neglected. The book gives a complete review and theoretical analysis of two- and three-phase fluid flow, plus a basic introduction to single-well pressure transient testing which is essential to the evaluation of volume, intrinsic reservoir pressure, reservoir discontinuities, in situ permeability and many other data required for complete reservoir evaluation. A discussion of oilfield waters is followed closely by the chemical and physical properties of employing various current EOR techniques. The book will interest a wide range of readers. Teachers of petroleum engineering will find it a ready reference to basic requirements for implementation of various EOR processes. Petroleum engineering researchers can use it to review the current state-of-the-art of the basic premise of EOR and find in it the necessary background analyses for projection of future research. The field-oriented, practical petroleum engineer will discover it to be a reliable reference to criteria for pre-EOR reservoir analysis.

Asphaltene Deposition

This volume provides a comprehensive review that consolidates all of the pertinent information available. Microbial Enhanced Oil Recovery (MEOR) involves many scientific disciplines, many different approaches, and many different countries. This book supplies the information needed for continued development of MEO methods and points out areas where information is lacking and where more research is needed. This easy-to-use resource focuses on the three types of MEOR

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processes which can be utilized to recover oil from reservoirs. Successful MEOR involves contributions from petroleum, chemical, genetic, environmental, geotechnical, and bioengineering. Also, geology, chemistry, and microbiology play a major role as well. This critical review book includes a comprehensive reference list and opens the lines of communication among the various fields of study. This work will also encourage the exchange of ideas and interaction necessary for success in this quickly developing technology. Scientists, researchers, and practitioners will find this text to be interesting, informative, and indispensable.

Essentials of Polymer Flooding Technique

As global consumption of fossil fuels such as oil increases, previously abundant sources have become depleted or plagued with obstructions. Asphaltene deposition is one of such obstructions which can significantly decrease the rate of oil production. This book offers concise yet thorough coverage of the complex problem of asphaltene precipitation and deposition in oil production. It covers fundamentals of chemistry, stabilization theories and mechanistic approaches of asphaltene behavior at high temperature and pressure. Asphaltene Deposition: Fundamentals, Prediction, Prevention, and Remediation explains techniques for experimental determination of asphaltene precipitation and deposition and different modeling tools available to forecast the occurrence and magnitude of

asphaltene deposition in a given oil field. It discusses strategies for mitigation of asphaltene deposition using chemical inhibition and corresponding challenges, best practices for asphaltene remediation, current research, and case studies.

Formation Damage During Improved Oil Recovery

Chemical Enhanced Oil Recovery Handbook: Screening, Formulation, and Implementation offers engineers a platform to discover the latest strategies and technologies for maximizing the ultimate recovery factor from operating fields. This comprehensive handbook, based on years of field experience, provides engineers with the methods, tools, and techniques needed to successfully plan, evaluate, manage, and complete an enhanced oil recovery project. The book features a clear and rigorous exposition of theory, sections concerning real-world applications, and a password protected website. The handbook illustrates the EOR decision-making workflow using field case examples from several countries. Assets evaluated include reservoir types ranging from oil sands to condensate reservoirs. Different stages of development and information availability are discussed. Results show the advantage of a flexible decision-making workflow. This approach combines geologic and engineering data, minimizing experts' bias, and also combines technical and financial figures. The proposed methodology has proved useful to evaluating projects and properties very rapidly to identify when upside potential exists. Other topics covered include: chemical injection, gas injection,

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ultrasonic stimulation equipment and process, microbial injection, thermal recovery, and carbon dioxide-enhanced oil recovery. Each topic is accompanied by a description of the equipment and processes, case studies, and modeling methods. Features the latest case studies from Asia, Canada, Mexico, South America, and the United States Evaluates assets including reservoir types ranging from oil sands to condensate reservoirs Discusses different stages of development and information availability Provides preliminary analytical simulations to estimate oil recovery potential Includes step-by-step modeling techniques for each method

Enhanced Oil Recovery Field Case Studies

Fossil fuels still need to meet the growing demand of global economic development, yet they are often considered as one of the main sources of the CO₂ release in the atmosphere. CO₂, which is the primary greenhouse gas (GHG), is periodically exchanged among the land surface, ocean, and atmosphere where various creatures absorb and produce it daily. However, the balanced processes of producing and consuming the CO₂ by nature are unfortunately faced by the anthropogenic release of CO₂. Decreasing the emissions of these greenhouse gases is becoming more urgent. Therefore, carbon sequestration and storage (CSS) of CO₂, its utilization in oil recovery, as well as its conversion into fuels and chemicals emerge as active options and potential strategies to mitigate CO₂ emissions and climate change, energy crises, and challenges in the storage of

energy.

Enhanced Oil Recovery Field Case Studies

IPCC Report on sources, capture, transport, and storage of CO₂, for researchers, policy-makers and engineers.

Polymer-Improved Oil Recovery

Petroleum Engineer's Guide to Oil Field Chemicals and Fluids is a comprehensive manual that provides end users with information about oil field chemicals, such as drilling muds, corrosion and scale inhibitors, gelling agents and bacterial control. This book is an extension and update of Oil Field Chemicals published in 2003, and it presents a compilation of materials from literature and patents, arranged according to applications and the way a typical job is practiced. The text is composed of 23 chapters that cover oil field chemicals arranged according to their use. Each chapter follows a uniform template, starting with a brief overview of the chemical followed by reviews, monomers, polymerization, and fabrication. The different aspects of application, including safety and environmental impacts, for each chemical are also discussed throughout the chapters. The text also includes handy indices for trade names, acronyms and chemicals. Petroleum, production,

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drilling, completion, and operations engineers and managers will find this book invaluable for project management and production. Non-experts and students in petroleum engineering will also find this reference useful. Chemicals are ordered by use including drilling muds, corrosion inhibitors, and bacteria control Includes cutting edge chemicals and polymers such as water soluble polymers and viscosity control Handy index of chemical substances as well as a general chemical index

Chemical Enhanced Oil Recovery Handbook

Oil Recovery in Shale and Tight Reservoirs delivers a current, state-of-the-art resource for engineers trying to manage unconventional hydrocarbon resources. Going beyond the traditional EOR methods, this book helps readers solve key challenges on the proper methods, technologies and options available. Engineers and researchers will find a systematic list of methods and applications, including gas and water injection, methods to improve liquid recovery, as well as spontaneous and forced imbibition. Rounding out with additional methods, such as air foam drive and energized fluids, this book gives engineers the knowledge they need to tackle the most complex oil and gas assets. Helps readers understand the methods and mechanisms for enhanced oil recovery technology, specifically for shale and tight oil reservoirs Includes available EOR methods, along with recent practical case studies that cover topics like fracturing fluid flow back Teaches additional methods, such as soaking after fracturing, thermal recovery and

microbial EOR

Modern Chemical Enhanced Oil Recovery

This book presents the proceedings of the 4th International Conference on Integrated Petroleum Engineering and Geosciences 2016 (ICIPEG 2016), held under the banner of World Engineering, Science & Technology Congress (ESTCON 2016) at Kuala Lumpur Convention Centre from August 15 to 17, 2016. It presents peer-reviewed research articles on exploration, while also exploring a new area: shale research. In this time of low oil prices, it highlights findings to maintain the exchange of knowledge between researchers, serving as a vital bridge-builder between engineers, geoscientists, academics, and industry.

Enhanced Oil Recovery, II

This book covers all aspects of polymer flooding, an enhanced oil recovery method using water soluble polymers to increase the viscosity of flood water, for the displacement of crude oil from porous reservoir rocks. Although this method is becoming increasingly important, there is very little literature available for the engineer wishing to embark on such a project. In the past, polymer flooding was mainly the subject of research. The results of this research are spread over a vast

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number of single publications, making it difficult for someone who has not kept up-to-date with developments during the last 10 to 15 years to judge the suitability of polymer flooding to a particular field case. This book tries to fill that gap. The basic mechanisms of the process are described and criteria given where it may be employed. Basic elements of the chemistry of EOR-polymers are provided. The fundamentals of polymer physics, such as rheology, flow in porous media and adsorption, are derived. Practical hints on mixing and testing of polymers in the laboratory are given, as well as instructions for their application in the oil field. Polymer flooding is illustrated by some case histories and the economics of the methods are examined. For the essential subjects, example calculations are added. An indispensable book for reservoir engineers, production engineers and laboratory technicians within the petroleum industry.

Polymer Flooding

Over a decade ago the World Petroleum Council launched an initiative to hold an international professional youth forum. The first forum took place in October 2004 in China, and had as its motto: "Young people and innovations are the future of the oil industry." It was the first major event in the history of the WPC in which young professionals and academics had the leading role, and had the opportunity to exchange their ideas in insights on the oil and gas industry with industry leaders and main representatives of the oil and gas industry. Since then, issues of

professional development and the disclosure of the creative potential of young industry professionals have been on the agenda of the World Petroleum Council as one of the key areas for the development of international cooperation focused on a strategic perspective. The Future Leaders Forum of the World Petroleum Council VI is the largest international platform for professional communication of young specialists in the oil and gas industry. The contributions in this book are much of interest to professionals and scientists interested or involved in the oil and gas industry or related areas.

Surfactants for Enhanced Oil Recovery Applications

Oil and gas companies are looking for proven hydrocarbon reserves from their existent drained reservoirs with the objective to extend the production and economical life of their fields. The chemical enhanced oil recovery (CEOR) has raised with a myriad type of process that goes beyond the primary and secondary recovery. The polymer flooding (PF) is a widely applied process in reservoirs with low swept efficiency after the water flooding (WF) process. Colombian field has one of the first polymer pilots in the region with positive results of oil recovery in "A" sands. Thus, the operator is interested in the expansion of PF for the same reservoir and even in deeper reservoir sands. This thesis focuses in the evaluation of different scenarios of PF and surfactant polymer flooding (SPF) for the producer layers A and B with a mechanistic model, thus obtaining new recommendations for

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the recovery strategy in the field. Therefore, a sector model was constructed from a full field commercial simulator to the in-house simulator: UTCHEMRS. In addition, this sector model was migrated to a second commercial simulator allowing a performance comparison for three simulators. UTCHEMRS model was validated with the commercial simulators through the history matching (HM) phase. The primary and waterflood history match was in agreement with the field data. Simulation results suggested that PF for the base case in “A” sands presented an incremental oil recovery of up to 12% additional to water flooding. Additionally, PF was extended to the lower layer “B” sand to investigate the potential of polymer injection. The PF injection in both reservoirs simultaneously loses swept efficiency and decreases the oil recovery in 3%. However, a hypothetical case of new infill producer wells with the objective of testing the individual reservoir performance has revealed that PF is having important raises in oil recovery for B sands as well. Though, further research should be developed in order to strengthen this interpretation. Finally, the results of SPF case for A sands are inconclusive because a laboratory tests of surfactant phase behavior is needed to ensure the lowest IFT in reservoir conditions

Carbon Dioxide Chemistry, Capture and Oil Recovery

This book presents new insights into the development of different aspects of petroleum science and engineering. The book contains 19 chapters divided into

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two main sections: (i) Exploration and Production and (ii) Environmental Solutions. There are 11 chapters in the first section, and the focus is on the topics related to exploration and production of oil and gas, such as characterization of petroleum source rocks, drilling technology, characterization of reservoir fluids, and enhanced oil recovery. In the second section, the special emphasis is on waste technologies and environmental cleanup in the downstream sector. The book written by numerous prominent scholars clearly shows the necessity of the multidisciplinary approach to sustainable development in the petroleum industry and stresses the most updated topics such as EOR and environmental cleanup of fossil fuel wastes.

Enhanced Oil Recovery Field Case Studies

Enhanced oil recovery field case studies bridge the gap between theory and practice in a range of real-world EOR settings. Areas covered include steam and polymer flooding, use of foam, in situ combustion, microorganisms, "smart water"-based EOR in carbonates and sandstones, and many more. Oil industry professionals know that the key to a successful enhanced oil recovery project lies in anticipating the differences between plans and the realities found in the field. This book aids that effort, providing valuable case studies from more than 250 EOR pilot and field applications in a variety of oil fields. The case studies cover practical problems, underlying theoretical and modeling methods, operational parameters, solutions and sensitivity studies, and performance optimization strategies,

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benefitting academicians and oil company practitioners alike. Strikes an ideal balance between theory and practice.

Environmental Aspects of Oil and Gas Production

This book covers new micro-/nanoemulsion systems in technology that has developed our knowledge of emulsion stability. The emulsion system is a major phenomenon in well-qualified products and has extensive usages in cosmetic industry, food industry, oil recovery, and mineral processes. In this book, readers will find recent studies, applications, and new technological developments on fundamental properties of emulsion systems.

Science and Technology Behind Nanoemulsions

This book gathers selected papers from the 8th International Field Exploration and Development Conference (IFEDC 2018) and addresses a broad range of topics, including: Reservoir Surveillance and Management, Reservoir Evaluation and Dynamic Description, Reservoir Production Stimulation and EOR, Ultra-Tight Reservoirs, Unconventional Oil and Gas Resources Technology, Oil and Gas Well Production Testing, and Geomechanics. In brief, the papers introduce readers to upstream technologies used in oil & gas development, the main principles of the

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process, and various related design technologies. 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.

Enhanced Oil Recovery

Enhanced-Oil Recovery (EOR) evaluations focused on asset acquisition or rejuvenation involve a combination of complex decisions, using different data sources. EOR projects have been traditionally associated with high CAPEX and OPEX, as well as high financial risk, which tend to limit the number of EOR projects launched. In this book, the authors propose workflows for EOR evaluations that account for different volumes and quality of information. This flexible workflow has been successfully applied to oil property evaluations and EOR feasibility studies in many oil reservoirs. The methodology associated with the workflow relies on traditional (look-up tables, XY correlations, etc.) and more advanced (data mining for analog reservoir search and geology indicators) screening methods, emphasizing identification of analogues to support decision making. The screening phase is combined with analytical or simplified numerical simulations to estimate full-field performance by using reservoir data-driven segmentation procedures. Case Studies from Asia, Canada, Mexico, South America and the United States

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Assets evaluated include reservoir types ranging from oil sands to condensate reservoirs. Different stages of development and information availability are discussed

Introduction to Enhanced Recovery Methods for Heavy Oil and Tar Sands

This chapter contains a thorough coverage of in situ combustion (ISC) as an enhanced oil recovery method, describing its complex aspects in a simple and practical manner. It is the first really international treatise of the subject as the international experience was carefully put together.

Enhanced Oil Recovery Field Case Studies

Within the last 10 years the world has come to a point where the easily explorable oil deposits have now been found, and it is anticipated that such deposits will be depleted by the beginning of the Twenty-first Century. However, the increasing demand of man kind for energy has caused technologists to look into ways of finding new sources or to reevaluate unconventional sources which, in the past, have not been economical. In this respect, heavy crude and tar sand oils are becoming important in fulfilling the world's energy requirements. What are heavy crude and

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tar sand oils? There is still some confusion as to their definitions, inasmuch as they vary among organizations and countries. In an effort to set agreed meanings, UNITAR, in a meeting in February 1982 in Venezuela, proposed the following definitions (see also Table 1): 1. Heavy crude oil and tar sand oil are petroleum or petroleum like liquids or semi-solids naturally occurring in porous media. The porous media are sands, sandstone, and carbonate rocks. 2. These oils will be characterized by viscosity and density. Viscosity will be used to define heavy crude oil and tar sand oil, and density (oAPI) will be used when viscosity measurements are not available. 3. Heavy crude oil has a gas-free viscosity of 100-10000 mPa.s (cp) 3 o at reservoir temperatures, or a density of 943 kg/m (20 API) 3 o o to 1000 kg/m (10 API) at 15.6 C and at atmospheric oressure.

Drilling

This book provides a concise treatise on the use of surfactants in enhanced oil recovery (EOR), including information on key types of surfactants and their respective applications in the wider petroleum industry. The authors discuss carbon dioxide EOR, alkaline-surfactant-polymer flooding strategies, and the use of surfactants as a means of reducing interfacial tension, while also paying special attention to the challenges involved in using surfactants for enhanced oil recovery, such as the difficult issue of surfactant adsorption on reservoir rock. All chapters highlight and are based on the authors' own laboratory-scale case studies. Given

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its content, the book offers a valuable asset for graduate students of petroleum and chemical engineering, as well as researchers in the field of chemical enhanced oil recovery. It will also be of interest to professionals involved in enhanced industrial oil recovery.

Heavy Oils

Developments in microbial-enhanced oil recovery (MEOR) have made huge advancements over the last few years. A new programmatic approach to MEOR is organic oil recovery (OOR), the management of the microbial ecology to facilitate the release of oil from the reservoir. Using this breakthrough process, which does not require microbes to be injected, over 180 applications have been conducted between 2007 and 2011 in producing oil and water-injection wells in the United States and Canada. This chapter reviews the OOR process, a summary of results and two case studies in detail.

Proceedings of the International Field Exploration and Development Conference 2018

This book is divided in two sections. Several chapters in the first section provide a state-of-the-art review of various carbon sinks for CO₂ sequestration such as soil

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and oceans. Other chapters discuss the carbon sequestration achieved by storage in kerogen nanopores, CO₂ miscible flooding and generation of energy efficient solvents for postcombustion CO₂ capture. The chapters in the second section focus on monitoring and tracking of CO₂ migration in various types of storage sites, as well as important physical parameters relevant to sequestration. Both researchers and students should find the material useful in their work.

Petroleum Engineer's Guide to Oil Field Chemicals and Fluids

Primer on Enhanced Oil Recovery gives the oil and gas market the introductory information it needs to cover the physical and chemical properties of hydrocarbon reservoir fluids and rock, drilling operations, rock-fluid interactions, recovery methods, and the economy of enhanced oil recovery projects. Beginning with introductory materials on basic physics and oil-rock interaction, the book then progresses into well-known types of EOR, such as gas injection and microbial EOR. Other sections cover hybrid EOR, smart water/low salinity and solar EOR. Worldwide case study examples give engineers the go-to starting point they need to understand the fundamentals of EOR techniques and data. Discusses basic physics and chemistry in oil, oil-rock interaction, variation of oil, and interaction properties with temperature Helps readers understand why and when EOR can be used Includes data on EOR implementation and economics

Heavy Crude Oil Recovery

Commercial application of chemical enhanced oil recovery (cEOR) processes is expected to grow significantly over the next decade. Thus, *Chemical Enhanced Oil Recovery (cEOR): A Practical Overview* offers key knowledge and understanding of cEOR processes using an evidence-based approach intended for a broad audience ranging from field operators, researchers, to reservoir engineers dealing with the development and planning of cEOR field applications. This book is structured into three sections; the first section surveys overall EOR processes. The second section focuses on cEOR processes, while the final section describes the electrorheology technology. These sections are presented using a practical and realistic approach tailored for readers looking to improve their knowledge and understanding of cEOR processes in a nutshell.

Enhanced Oil Recovery Field Case Studies

An overview of the geophysical techniques and analysis methods for monitoring subsurface carbon dioxide storage for researchers and industry practitioners.

Miscible Displacement

Microbial Enhanced Oil Recovery

Provides an easy-to-read introduction to the area of polymer flooding to improve oil production. The production and utilization of oil has transformed our world. However, dwindling reserves are forcing industry to manage resources more efficiently, while searching for alternative fuel sources that are sustainable and environmentally friendly. Polymer flooding is an enhanced oil recovery technique that improves sweep, reduces water production, and improves recovery in geological reservoirs. This book summarizes the key factors associated with polymers and polymer flooding—from the selection of the type of polymer through characterization techniques, to field design and implementation—and discusses the main issues to consider when deploying this technology to improve oil recovery from mature reservoirs. *Essentials of Polymer Flooding Technique* introduces the area of polymer flooding at a basic level for those new to petroleum production. It describes how polymers are used to improve efficiency of “chemical” floods (involving surfactants and alkaline solutions). The book also offers a concise view of several key polymer-flooding topics that can’t be found elsewhere. These are in the areas of pilot project design, field project engineering (water quality, oxygen removal, polymer dissolution equipment, filtration, pumps and other equipment), produced water treatment, economics, and some of the important field case histories that appear in the last section. Provides an easy to read introduction to polymer flooding to improve oil production whilst presenting the underlying

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mechanisms Employs "In A Nutshell" key point summaries at the end of each chapter Includes important field case studies to aid researchers in addressing time- and financial-consumption in dealing with this issue Discusses field engineering strategies appropriate for professionals working in field operation projects Essentials of Polymer Flooding Technique is an enlightening book that will be of great interest to petroleum engineers, reservoir engineers, geoscientists, managers in petroleum industry, students in the petroleum industry, and researchers in chemical enhanced oil recovery methods.

Chemical Enhanced Oil Recovery Simulation in Highly Stratified Heterogeneous Reservoir

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

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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.

Enhanced Oil Recovery in Shale and Tight Reservoirs

The importance of oil in the world economy cannot be overstated, and methods for recovering oil will be the subject of much scientific and engineering research for many years to come. Even after the application of primary depletion and secondary recovery processes (usually waterflooding), much oil usually remains in a reservoir, and indeed in some heterogeneous reservoir systems as much as 70% of the original oil may remain. Thus, there is an enormous incentive for the development of improved or enhanced methods of oil recovery, aimed at recovering some portion of this remaining oil. The techniques used range from 'improved' secondary flooding methods (including polymer and certain gas injection processes) through to 'enhanced' or 'tertiary' methods such as chemical (surfactant, caustic, foam), gas miscible (carbon dioxide, gas reinjection) and

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thermal (steam soak and drive, in-situ combustion). The distinction between the classification of the methods usually refers to the target oil that the process seeks to recover. That is, in 'improved' recovery we are usually aiming to increase the oil sweep efficiency, whereas in 'tertiary' recovery we aim to mobilise and recover residual or capillary trapped oil. There are a few books and collections of articles which give general overviews of improved and enhanced oil recovery methods. However, for each recovery method, there is such a wide range of interconnected issues concerning the chemistry, physics and fluid mechanics of flow in porous media, that rarely are these adequately reviewed.

Enhanced Oil Recovery, I

Written by foremost experts in the field, and formulated with attention to classroom use for advanced studies in reservoir characterization and processes, this book reviews and summarises state-of-the-art progress in the field of enhanced oil recovery (EOR). All of the available techniques: alkaline flooding; surfactant flooding; carbon dioxide flooding; steam flooding; in-situ combustion; gas injection; miscible flooding; microbial recovery; and polymer flooding are discussed and compared. Together with Volume I, it presents a complete text on enhanced recovery technology and, hence, is an almost indispensable reference text. This second volume compliments the first by presenting as complete an analysis as possible of current oilfield theory and technology, for accomplishment

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of maximum production of oil. Many different processes have been developed and field tested for enhancement of oil recovery. The emerging philosophy is that no single process is applicable to all petroleum reservoirs. Each must be treated as unique, and carefully evaluated for characteristics that are amenable to one or two of the proven technologies of EOR. This book will aid the engineer in field evaluation and selection of the best EOR technology for a given oilfield. Even the emerging technology of microbial applications to enhance oil recovery are reviewed and explained in terms that are easily understood by field engineers. The book is presented in a manner suitable for graduate studies. The only addition required of teachers is to supply example problems for class work. An appendix includes a reservoir mathematic model and program for general application that can also be used for teaching.

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