

Reservoir Engineering 2 Heriot Watt University

This book gives practical advice and ready to use tips on the design and construction of subsurface reservoir models. The design elements cover rock architecture, petrophysical property modelling, multi-scale data integration, upscaling and uncertainty analysis. Philip Ringrose and Mark Bentley share their experience, gained from over a hundred reservoir modelling studies in 25 countries covering clastic, carbonate and fractured reservoir types, and for a range of fluid systems – oil, gas and CO₂, production and injection, and effects of different mobility ratios. The intimate relationship between geology and fluid flow is explored throughout, showing how the impact of fluid type, displacement mechanism and the subtleties of single- and multi-phase flow combine to influence reservoir model design. The second edition updates the existing sections and adds sections on the following topics: • A new chapter on modelling for CO₂ storage • A new chapter on modelling workflows • An extended chapter on fractured reservoir modelling • An extended chapter on multi-scale modelling • An extended chapter on the quantification of uncertainty • A revised section on the future of modelling based on recently published papers by the authors

The main audience for this book is the community of applied geoscientists and engineers involved in understanding fluid flow in the subsurface: whether for the extraction of oil or gas or the injection of CO₂ or the subsurface storage of energy in general. We will always need to understand how fluids move in the subsurface and we will always require skills to model these quantitatively. The second edition of this reference book therefore aims to highlight the modelling skills developed for the current energy industry which will also be required for the energy transition of the future. The book is aimed at technical-professional practitioners in the energy industry and is also suitable for a range of Master's level courses in reservoir characterisation, modelling and engineering.

- Provides practical advice and guidelines for users of 3D reservoir modelling packages
- Gives advice on reservoir model design for the growing world-wide activity in subsurface reservoir modelling
- Covers rock modelling, property modelling, upscaling, fluid flow and uncertainty handling
- Encompasses clastic, carbonate and fractured reservoirs
- Applies to multi-fluid cases and applications: hydrocarbons and CO₂, production and storage; rewritten for use in the Energy Transition.

Oil and gas are the most important non-renewable sources of energy. Exploring, producing and managing these resources in compliance with HSE standards are challenging tasks. New technologies, workflows and procedures have to be implemented. This book deals with some of these themes and describes some of the advanced technologies related to the oil and gas industry from HSE to field management issues. Some new technologies for geo-modeling, transient well testing and digital rock physics are also introduced. There are many more technical topics to be addressed in future books. This book is aimed at

researchers, petroleum engineers, geoscientists and people working within the petroleum industry.

This book provides concise, up-to-date and easy-to-follow information on certain aspects of an ever important research area: multiphase flow in porous media. This flow type is of great significance in many petroleum and environmental engineering problems, such as in secondary and tertiary oil recovery, subsurface remediation and CO₂ sequestration. This book contains a collection of selected papers (all refereed) from a number of well-known experts on multiphase flow. The papers describe both recent and state-of-the-art modeling and experimental techniques for study of multiphase flow phenomena in porous media. Specifically, the book analyses three advanced topics: upscaling, pore-scale modeling, and dynamic effects in multiphase flow in porous media. This will be an invaluable reference for the development of new theories and computer-based modeling techniques for solving realistic multiphase flow problems. Part of this book has already been published in a journal. Audience This book will be of interest to academics, researchers and consultants working in the area of flow in porous media.

A comprehensive and practical guide to methods for solving complex petroleum engineering problems Petroleum engineering is guided by overarching scientific and mathematical principles, but there is sometimes a gap between theoretical knowledge and practical application. Petroleum Engineering: Principles, Calculations, and Workflows presents methods for solving a wide range of real-world petroleum engineering problems. Each chapter deals with a specific issue, and includes formulae that help explain primary principles of the problem before providing an easy to follow, practical application. Volume highlights include: A robust, integrated approach to solving inverse problems In-depth exploration of workflows with model and parameter validation Simple approaches to solving complex mathematical problems Complex calculations that can be easily implemented with simple methods Overview of key approaches required for software and application development Formulae and model guidance for diagnosis, initial modeling of parameters, and simulation and regression Petroleum Engineering: Principles, Calculations, and Workflows is a valuable and practical resource to a wide community of geoscientists, earth scientists, exploration geologists, and engineers. This accessible guide is also well-suited for graduate and postgraduate students, consultants, software developers, and professionals as an authoritative reference for day-to-day petroleum engineering problem solving.

"This book is fast becoming the standard text in its field", wrote a reviewer in the Journal of Canadian Petroleum Technology soon after the first appearance of Dake's book. This prediction quickly came true: it has become the standard text and has been reprinted many times. The author's aim - to provide students and teachers with a coherent account of the basic physics of reservoir engineering - has been most successfully achieved. No prior knowledge of reservoir

engineering is necessary. The material is dealt with in a concise, unified and applied manner, and only the simplest and most straightforward mathematical techniques are used. This low-priced paperback edition will continue to be an invaluable teaching aid for years to come.

This book on well test analysis, and the use of advanced interpretation models is volume 3 in the series Handbook of Petroleum Exploration and Production. The chapters in the book are: Principles of Transient Testing, Analysis Methods, Wellbore Conditions, Effect of Reservoir Heterogeneities on Well Responses, Effect of Reservoir Boundaries on Well Responses, Multiple Well Testing, Application to Gas Reservoirs, Application to Multiphase Reservoirs, Special Tests, Practical Aspects of Well Test Interpretation.

Geological storage and sequestration of carbon dioxide, in saline aquifers, depleted oil and gas fields or unminable coal seams, represents one of the most important processes for reducing humankind's emissions of greenhouse gases. Geological storage of carbon dioxide (CO₂) reviews the techniques and wider implications of carbon dioxide capture and storage (CCS). Part one provides an overview of the fundamentals of the geological storage of CO₂. Chapters discuss anthropogenic climate change and the role of CCS, the modelling of storage capacity, injectivity, migration and trapping of CO₂, the monitoring of geological storage of CO₂, and the role of pressure in CCS. Chapters in part two move on to explore the environmental, social and regulatory aspects of CCS including CO₂ leakage from geological storage facilities, risk assessment of CO₂ storage complexes and public engagement in projects, and the legal framework for CCS. Finally, part three focuses on a variety of different projects and includes case studies of offshore CO₂ storage at Sleipner natural gas field beneath the North Sea, the CO₂CRC Otway Project in Australia, on-shore CO₂ storage at the Ketzin pilot site in Germany, and the K12-B CO₂ injection project in the Netherlands. Geological storage of carbon dioxide (CO₂) is a comprehensive resource for geoscientists and geotechnical engineers and academics and researches interested in the field. Reviews the techniques and wider implications of carbon dioxide capture and storage (CCS) An overview of the fundamentals of the geological storage of CO₂ discussing the modelling of storage capacity, injectivity, migration and trapping of CO₂ among other subjects Explores the environmental, social and regulatory aspects of CCS including CO₂ leakage from geological storage facilities, risk assessment of CO₂ storage complexes and the legal framework for CCS

This book contains the scientific contributions to the 11th International Workshop on Bifurcation and Degradation in Geomaterials (IWBDG) held in Limassol-Cyprus, May 21-25, 2017. The IWBDG series have grown in size and scope, since their inception 30 years ago in Germany, covering more and wider areas of geomaterials and geomechanics research including modern trends. The papers cover a wide range of topics including advances in instabilities, localized and diffuse failure, micromechanical, multiscale phenomena, multiphysics modeling

and other related topics. This volume gathers a series of manuscript by brilliant international scholars who work on modern recent advances in experimental, theoretical and numerical methods. The theoretical and applied mechanics are linked successfully with engineering applications in traditional and in emerging fields, such as geomechanics for the energy and the environment. The quality of the contributed papers has benefited from the peer review process by expert referees. This book can be used as a useful reference for research students, academics and practicing engineers who are interested in the instability and degradation problems in geomaterials, geomechanics, geotechnical engineering and other related applications.

This volume highlights key challenges for fluid-flow prediction in carbonate reservoirs, the approaches currently employed to address these challenges and developments in fundamental science and technology. The papers span methods and case studies that highlight workflows and emerging technologies in the fields of geology, geophysics, petrophysics, reservoir modelling and computer science. Topics include: detailed pore-scale studies that explore fundamental processes and applications of imaging and flow modelling at the pore scale; case studies of diagenetic processes with complementary perspectives from reactive transport modelling; novel methods for rock typing; petrophysical studies that investigate the impact of diagenesis and fault-rock properties on acoustic signatures; mechanical modelling and seismic imaging of faults in carbonate rocks; modelling geological influences on seismic anisotropy; novel approaches to geological modelling; methods to represent key geological details in reservoir simulations and advances in computer visualization, analytics and interactions for geoscience and engineering.

Due to the influence of pore-throat size distribution, pore connectivity, and microscale fractures, the transport, distribution, and residual saturation of fluids in porous media are difficult to characterize. Petrophysical methods in natural porous media have attracted great attention in a variety of fields, especially in the oil and gas industry. A wide range of research studies have been conducted on the characterization of porous media covers and multiphase flow therein. Reliable approaches for characterizing microstructure and multiphase flow in porous media are crucial in many fields, including the characterization of residual water or oil in hydrocarbon reservoirs and the long-term storage of supercritical CO₂ in geological formations. This book gathers together 15 recent works to emphasize fundamental innovations in the field and novel applications of petrophysics in unconventional reservoirs, including experimental studies, numerical modeling (fractal approach), and multiphase flow modeling/simulations. The relevant stakeholders of this book are authorities and service companies working in the petroleum, subsurface water resources, air and water pollution, environmental, and biomaterial sectors.

Practical Reservoir Characterization expertly explains key technologies, concepts, methods, and terminology in a way that allows readers in varying roles

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

Hardcover plus CD

New Scientist magazine was launched in 1956 "for all those men and women who are interested in scientific discovery, and in its industrial, commercial and social consequences". The brand's mission is no different today - for its consumers, New Scientist reports, explores and interprets the results of human endeavour set in the context of society and culture.

This book provides a self-contained introduction to the simulation of flow and transport in porous media, written by a developer of numerical methods. The reader will learn how to implement reservoir simulation models and computational algorithms in a robust and efficient manner. The book contains a large number of numerical examples, all fully equipped with online code and data, allowing the reader to reproduce results, and use them as a starting point for their own work. All of the examples in the book are based on the MATLAB Reservoir Simulation Toolbox (MRST), an open-source toolbox popular popularity in both academic institutions and the petroleum industry. The book can also be seen as a user guide to the MRST software. It will prove invaluable for researchers, professionals and advanced students using reservoir simulation methods. This title is also available as Open Access on Cambridge Core.

This book on hydrocarbon exploration and production is the first volume in the series Developments in Petroleum Science. The chapters are: The Field Life Cycle, Exploration, Drilling Engineering, Safety and The Environment, Reservoir Description, Volumetric Estimation, Field Appraisal, Reservoir Dynamic Behaviour, Well Dynamic Behaviour, Surface Facilities, Production Operations and Maintenance, Project and Contract Management, Petroleum Economics, Managing the Producing Field, and Decommissioning.

A strong foundation in reservoir rock and fluid properties is the backbone of

almost all the activities in the petroleum industry. Suitable for undergraduate students in petroleum engineering, Petroleum Reservoir Rock and Fluid Properties, Second Edition offers a well-balanced, in-depth treatment of the fundamental concepts and practical aspects that encompass this vast discipline. New to the Second Edition Introductions to Stone II three-phase relative permeability model and unconventional oil and gas resources Discussions on low salinity water injection, saturated reservoirs and production trends of five reservoir fluids, impact of mud filtrate invasion and heavy organics on samples, and flow assurance problems due to solid components of petroleum Better plots for determining oil and water Corey exponents from relative permeability data Inclusion of Rachford-Rice flash function, Plateau equation, and skin effect Improved introduction to reservoir rock and fluid properties Practice problems covering porosity, combined matrix-channel and matrix-fracture permeability, radial flow equations, drilling muds on fluid saturation, wettability concepts, three-phase oil relative permeability, petroleum reservoir fluids, various phase behavior concepts, phase behavior of five reservoir fluids, and recombined fluid composition Detailed solved examples on absolute permeability, live reservoir fluid composition, true boiling point extended plus fractions properties, viscosity based on compositional data, and gas-liquid surface tension Accessible to anyone with an engineering background, the text reveals the importance of understanding rock and fluid properties in petroleum engineering. Key literature references, mathematical expressions, and laboratory measurement techniques illustrate the correlations and influence between the various properties. Explaining how to acquire accurate and reliable data, the author describes coring and fluid sampling methods, issues related to handling samples for core analyses, and PVT studies. He also highlights core and phase behavior analysis using laboratory tests and calculations to elucidate a wide range of properties. The two volume set LNCS 7491 and 7492 constitutes the refereed proceedings of the 12th International Conference on Parallel Problem Solving from Nature, PPSN 2012, held in Taormina, Sicily, Italy, in September 2012. The total of 105 revised full papers were carefully reviewed and selected from 226 submissions. The meeting began with 6 workshops which offered an ideal opportunity to explore specific topics in evolutionary computation, bio-inspired computing and metaheuristics. PPSN 2012 also included 8 tutorials. The papers are organized in topical sections on evolutionary computation; machine learning, classifier systems, image processing; experimental analysis, encoding, EDA, GP; multiobjective optimization; swarm intelligence, collective behavior, coevolution and robotics; memetic algorithms, hybridized techniques, meta and hyperheuristics; and applications. Now in its 50th edition, British Qualifications 2020 is the definitive one-volume guide to every recognized qualification on offer in the United Kingdom. With an equal focus on both academic and professional vocational studies, this indispensable guide has full details of all institutions and organizations involved in

the provision of further and higher education, making it the essential reference source for careers advisers, students, and employers. It also contains a comprehensive and up-to-date description of the structure of further and higher education in the UK, including an explanation of the most recent education reforms, providing essential context for the qualifications listed. British Qualifications 2020 is compiled and checked annually to ensure the highest currency and accuracy of this valuable information. Containing details on the professional vocational qualifications available from over 350 professional institutions and accrediting bodies, informative entries for all UK academic universities and colleges, and a full description of the current structural and legislative framework of academic and vocational education, it is the complete reference for lifelong learning and continuing professional development in the UK.

Understanding the properties of a reservoir's fluids and creating a successful model based on lab data and calculation are required for every reservoir engineer in oil and gas today, and with reservoirs becoming more complex, engineers and managers are back to reinforcing the fundamentals. PVT (pressure-volume-temperature) reports are one way to achieve better parameters, and Equations of State and PVT Analysis, 2nd Edition, helps engineers to fine tune their reservoir problem-solving skills and achieve better modeling and maximum asset development. Designed for training sessions for new and existing engineers, Equations of State and PVT Analysis, 2nd Edition, will prepare reservoir engineers for complex hydrocarbon and natural gas systems with more sophisticated EOS models, correlations and examples from the hottest locations around the world such as the Gulf of Mexico, North Sea and China, and Q&A at the end of each chapter. Resources are maximized with this must-have reference. Improve with new material on practical applications, lab analysis, and real-world sampling from wells to gain better understanding of PVT properties for crude and natural gas Sharpen your reservoir models with added content on how to tune EOS parameters accurately Solve more unconventional problems with field examples on phase behavior characteristics of shale and heavy oil

Petroleum Production Engineering, Second Edition, updates both the new and veteran engineer on how to employ day-to-day production fundamentals to solve real-world challenges with modern technology. Enhanced to include equations and references with today's more complex systems, such as working with horizontal wells, workovers, and an entire new section of chapters dedicated to flow assurance, this go-to reference remains the most all-inclusive source for answering all upstream and midstream production issues. Completely updated with five sections covering the entire production spectrum, including well productivity, equipment and facilities, well stimulation and workover, artificial lift methods, and flow assurance, this updated edition continues to deliver the most practical applied production techniques, answers, and methods for today's

production engineer and manager. In addition, updated Excel spreadsheets that cover the most critical production equations from the book are included for download. Updated to cover today's critical production challenges, such as flow assurance, horizontal and multi-lateral wells, and workovers Guides users from theory to practical application with the help of over 50 online Excel spreadsheets that contain basic production equations, such as gas lift potential, multilateral gas well deliverability, and production forecasting Delivers an all-inclusive product with real-world answers for training or quick look up solutions for the entire petroleum production spectrum

This book constitutes the refereed proceedings of the 8th Pacific Rim Conference on Multimedia, PCM 2007, held in Hong Kong, China, in December 2007. The 73 revised full papers and 21 revised posters presented were carefully reviewed and selected from 247 submissions. The papers are organized in topical sections on image classification and retrieval, the AVS china national standard - technology, applications and products, human face and action recognition, and many more topics.

Of the 36 billion tons of carbon dioxide (CO₂) being emitted into Earth's atmosphere every year, only 40 million tons are able to be captured and stored. This is just a fraction of what needs to be captured, if this technology is going to make any headway in the global march toward reversing, or at least reducing, climate change. CO₂ capture and storage has long been touted as one of the leading technologies for reducing global carbon emissions, and, even though it is being used effectively now, it is still an emerging technology that is constantly changing. This volume, a collection of papers presented during the Cutting-Edge Technology for Carbon Capture, Utilization, and Storage (CETCCUS), held in Clermont-Ferrand, France in the fall of 2017, is dedicated to these technologies that surround CO₂ capture. Written by some of the most well-known engineers and scientists in the world on this topic, the editors, also globally known, have chosen the most important and cutting-edge papers that address these issues to present in this groundbreaking new volume, which follows their industry-leading series, *Advances in Natural Gas Engineering*, a seven-volume series also available from Wiley-Scrivener. With the ratification of the Paris Agreement, many countries are now committing to making real progress toward reducing carbon emissions, and this technology is, as has been discussed for years, one of the most important technologies for doing that. This volume is a must-have for any engineer or scientist working in this field.

Water, in all its forms, may be the key to an environmentally friendly energy economy. Water is free, there is plenty of it, plus it carries what is generally believed to be the best long-term source of green energy—hydrogen. *Water for Energy and Fuel Production* explores the many roles of water in the energy and fuel industry. The text not only discusses water's use as a direct source of energy and fuel—such as hydrogen from water dissociation, methane from water-based clathrate molecules, hydroelectric dams, and hydrokinetic energy from

tidal waves, off-shore undercurrents, and inland waterways—but also: Describes water's benign application in the production of oil, gas, coal, uranium, biomass, and other raw fuels, and as an energy carrier in the form of hot water and steam Examines water's role as a reactant, reaction medium, and catalyst—as well as steam's role as a reactant—for the conversion of raw fuels to synthetic fuels Explains how supercritical water can be used to convert fossil- and bio-based feedstock to synthetic fuels in the presence and absence of a catalyst Employing illustrative case studies and commercial examples, *Water for Energy and Fuel Production* demonstrates the versatility of water as a provider of energy and fuel, conveying the message that as energy demand and environmental concerns grow, so should our vigilance in pursuing the role of water in the energy landscape.

This volume reviews our current understanding and ability to model the complex distribution and behaviour of fault and fracture networks, highlighting their fluid compartmentalizing effects and storage-transmissivity characteristics, and outlining approaches for predicting the dynamic fluid flow and geomechanical behaviour of these reservoirs. This collection of 25 papers provides an overview of recent progress and outstanding issues in the areas of structural complexity and fault geometry, detection and prediction of faults and fractures, compartmentalizing effects of fault systems and complex siliciclastic reservoirs and critical controls affecting fractured reservoirs.

This work focuses on the impact of human activity on the geological environment and contains over 100 papers dealing with laboratory and field research investigations in geomechanics, geoengineering and mathematical modelling. Topics covered are grouped into eight main themes: response of the rock mass to human impact; slope stability; field research; laboratory research; stability of underground openings; mathematical modelling; stress measurements, and mineral and rock disintegration.

A strong foundation in reservoir rock and fluid properties is the backbone of almost all the activities in the petroleum industry. *Petroleum Reservoir Rock and Fluid Properties* offers a reliable representation of fundamental concepts and practical aspects that encompass this vast subject area. The book provides up-to-date coverage of vari

This book deals with complex fluid characterization of oil and gas reservoirs, emphasizing the importance of PVT parameters for practical application in reservoir simulation and management. It covers modeling of PVT parameters, QA/QC of PVT data from lab studies, EOS modeling, PVT simulation and compositional grading and variation. It describes generation of data for reservoir engineering calculations in view of limited and unreliable data and techniques like downhole fluid analysis and photophysics of reservoir fluids. It discusses behavior of unconventional reservoirs, particularly for difficult resources like shale gas, shale oil, coalbed methane, reservoirs, heavy and extra heavy oils.

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.

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.

Sustainable Oil and Gas Development Series: Drilling Engineering delivers research materials and emerging technologies that conform sustainability drilling criteria. Starting with ideal zero-waste solutions in drilling and long-term advantages, the reference discusses the sustainability approach through the use of non-linear solutions and works its way through the most conventional practices and procedures used today. Step-by-step formulations and examples are provided to demonstrate how to look at conventional practices versus sustainable approaches with eventually diverging towards a more sustainable alternative. Emerging technologies are covered and detailed sustainability analysis is included. Economic considerations, analysis, and long-term consequences, focusing on risk management round out the with conclusions and a extensive glossary. Sustainable Oil and Gas Development Series: Drilling Engineering gives today's petroleum and drilling engineers a guide how to analyze and evaluate their operations in a more environmentally-driven way. Proposes sustainable technical criteria and strategies for today's most common drilling practices such as horizontal drilling, managed pressure drilling, and unconventional shale activity Discusses economic benefits and development challenges to invest in environmentally-friendly operations Highlights the most recent research, analysis, and challenges that remain including global optimization

This volume brings together a number of papers from two workshops with the theme, 'Rain, Rivers, Reservoirs', which considered the dynamic changes to river systems as part of natural processes, particularly changing climatic conditions. Bringing researchers from two different locations to Brazil and the UK allowed scientists to contribute to and promote, 'debate on current research...on how the planet works and how we can live sustainably on it'. This volume features a series of papers on the geoscience of modern and ancient rivers from across the world (Brazil, United States, Spain, Argentina, Canada, India and the UK), their evolution through time, their management, their deposits and their engineering, with both subsurface aquifers/hydrocarbon reservoirs (of Carboniferous, Triassic and Cretaceous age) and surface reservoirs considered.

We often come across computational optimization virtually in all branches of engineering and

industry. Many engineering problems involve heuristic search and optimization, and, once discretized, may become combinatorial in nature, which gives rise to certain difficulties in terms of solution procedure. Some of these problems have enormous search spaces, are NP-hard and hence require heuristic solution techniques. Another difficulty is the lack of ability of classical solution techniques to determine appropriate optima of non-convex problems. Under these conditions, recent advances in computational optimization techniques have been shown to be advantageous and successful compared to classical approaches. This Volume presents some of the latest developments with a focus on the design of algorithms for computational optimization and their applications in practice. Through the chapters of this book, researchers and practitioners share their experience and newest methodologies with regard to intelligent optimization and provide various case studies of the application of intelligent optimization techniques in real-world applications. This book can serve as an excellent reference for researchers and graduate students in computer science, various engineering disciplines and the industry.

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