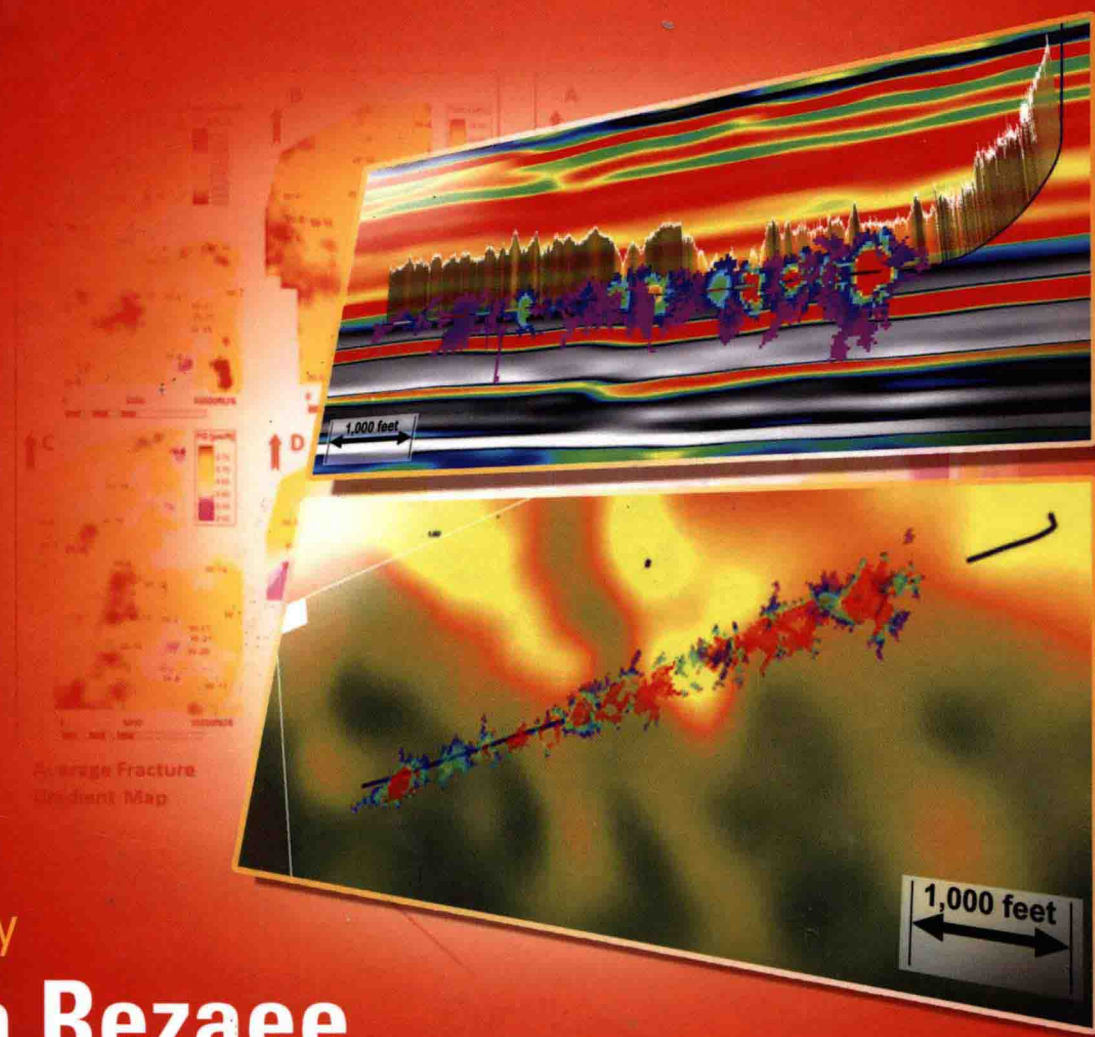


Fundamentals of **GAS SHALE RESERVOIRS**



Edited By
Reza Rezaee

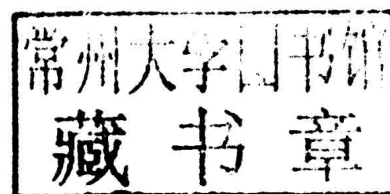
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Edited by

REZA REZAEI

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Published by John Wiley & Sons, Inc., Hoboken, New Jersey
Published simultaneously in Canada

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Library of Congress Cataloging-in-Publication Data:

Fundamentals of gas shale reservoirs / edited by Reza Rezaee.

pages cm

Includes bibliographical references and index.

ISBN 978-1-118-64579-6 (hardback)

1. Shale gas reservoirs. I. Rezaee, Reza.

TN870.57.F86 2015

553.2'85-dc23

2015007792

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

1 2015

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PREFACE

The hydrocarbon source from conventional reservoirs is decreasing rapidly. At the same time, global energy consumption is growing so quickly that conventional reserves alone cannot solely satisfy the demand. Therefore, there is a pressing need for alternative sources of energy. As things currently stand from a technical viewpoint, the more expensive clean-sustainable energy sources cannot compete with the relatively cheap nonrenewable fossil fuels. Thus, the obvious immediate alternative energy source would be found in non-conventional oil and gas resources. These non-conventional resources come in many forms and include gas hydrate, tar sand, oil shale, shale oil, tight gas sand, coal bed methane, and of course, shale gas. Shale gas has for some time been the focus of gas exploration and production in the USA and in other countries. Based on a recent EIA report, there is an estimated 7299 trillion cubic feet (Tcf) of technically recoverable shale gas resource to be found in some 137 basins located in 41 countries.

Following notable successes in shale gas production in the USA, to the point where that country now produces more shale gas than gas from the conventional sources, other countries are pursuing the same course. Even so, in order to be successful in the exploration and the development of shale gas plays, a number of important factors have to be taken into account:

- A vast knowledge of the different aspects of shales, such as organic geochemistry, mineralogy, petrophysical properties, shale geomechanics, reservoir engineering and so on, is required in order to properly evaluate and map shale gas sweet spots in each sedimentary basin.
- Shale gas environmental issues together with challenges such as the high water demands and possible contamination risks posed by hydraulic fracturing fluids and waste have to be addressed.

The aim of this book is to provide some guidance on the major factors involved in evaluating shale gas plays. The book is structured as follows:

Chapter 1 introduces shale gas from the point of view of its global significance, distribution and inherent challenges.

Chapter 2 discusses the environments suitable for organic matter-rich shale deposition.

Chapter 3 assesses the organic geochemical properties of shale gas resource systems.

Chapter 4 highlights important points about the sequence stratigraphy of shales.

Chapter 5 discusses methods used for evaluating pore geometry in shales.

Chapter 6 details the steps required for the petrophysical analysis of shale gas plays.

Chapter 7 deals with pore pressure estimation of shales using conventional log data.

Chapter 8 covers shale gas geomechanics.

Chapter 9 discusses the rock physics of organic-rich shales.

Chapter 10 introduces passive seismic methods for non-conventional resource development.

Chapter 11 discusses gas transport processes in shale.

Chapter 12 reviews the critical issues surrounding the simulation of transport and storage in shale reservoirs.

Chapter 13 provides important information about the performance analysis of shale reservoirs.

Chapter 14 presents methodologies to determine original gas in place (OGIP), technically recoverable resources (TRR) and the recovery factor (RF) for shale reservoirs.

Chapter 15 discusses molecular simulation of gas adsorption.

Chapter 16 deals with the wettability of gas shale reservoirs.

Chapter 17 summarises gas shale challenges expected to occur over the life cycle of the asset.

Chapter 18 presents gas shale environmental issues and challenges.

The study of shale gas plays is advancing rapidly in many countries, and I hope this book will provide some useful fundamental information on the topic.

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August 7, 2014*

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