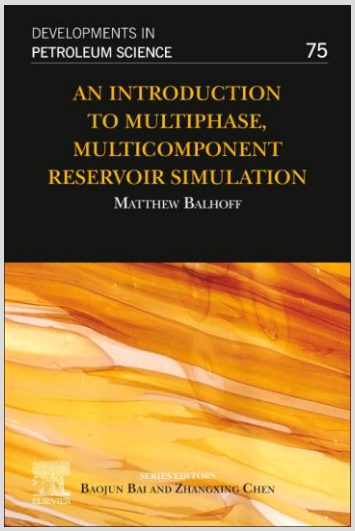


# An Introduction to Multiphase, Multicomponent Reservoir Simulation

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**AUDIENCE:** Graduate students and professionals in the oil and gas working in reservoir simulation. Upper-level undergraduate students in their first simulation course and geologists working in the oil and gas industry. Applicable courses or exams: Undergraduate and graduate courses in reservoir simulation (in petroleum geology and engineering programs)

**Covers the basics of reservoir simulation for students and professionals who are new to the field**

A Volume in the *Developments in Petroleum Science* Series

## KEY FEATURES

- Presents basic equations and discretization for multiphase, multicomponent transport in subsurface media in a simple, easy-to-understand manner
- Features illustrations that explain basic concepts and show comparison to analytical solutions and commercial simulators
- Includes dozens of completed example problems on a small number of grid blocks
- Offers pseudocode and exercises to allow the reader to develop their own computer-based numerical simulator that can be verified against analytical solutions and commercial simulators

## DESCRIPTION

*An Introduction to Petroleum Reservoir Simulation* is aimed toward graduate students and professionals in the oil and gas industry working in reservoir simulation. It begins with a review of fluid and rock properties and derivation of basic reservoir engineering mass balance equations. Then equations and approaches for numerical reservoir simulation are introduced. The text starts with simple problems (1D, single phase flow in homogeneous reservoirs with constant rate wells) and subsequent chapters slowly add complexities (heterogeneities, nonlinearities, multi-dimensions, multiphase flow, and multicomponent flow). Partial differential equations and finite differences are then introduced but it will be shown that algebraic mass balances can also be written directly on discrete grid blocks that result in the same equations. Many completed examples and figures will be included to improve understanding.

*An Introduction to Petroleum Reservoir Simulation* is designed for those with their first exposure to reservoir simulation, including graduate students in their first simulation course and working professionals who are using reservoir simulators and want to learn more about the basics.

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