

Reservoir Modelling & Simulation



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Introduction:

The course covers the fundamental and practical aspects of modern reservoir simulation and modelling. Particular emphasis is placed upon the available data and its integration into a data set that reflects a coherent model of the reservoir. The course starts with an overview of the fundamental principles of reservoir simulation and modelling and explains various types of simulators including black-oil, compositional, and dual porosity.

The role of simulation in managing a reservoir is also highlighted. This is followed by a detailed discussion of the required input data for a simulation- including rock properties, rock-fluid interactions, and PVT data. It explores the concept of upscaling and the impact it has on full-field modeling.

The course is designed to provide anyone involved in integrated projects an introduction to numerical reservoir simulation. Emphasis will be placed on the collection and interpretation of primary data in the construction of models. The student will be introduced to the general approaches to modelling including history matching of field data and forecasting future performance.

Objectives:

By the end of this course delegates will be able to:

- Have an understanding of the elements of a reservoir simulation model
- Understand how models are built
- Gain an appreciation for the fundamental concepts of reservoir simulation
- Gain a view on the tools used in the industry


Who should attend?

Geologists, Petro physicists, reservoir engineers, production engineers who are interested in obtaining an overview of simulation technology and how simulation fits into the reservoir development and optimization process, Geologists.

Course Outline:

- Introduction
- Simulator types
- Basic principles
- Review of mathematics
- Formulation of equations
- Mass balance equation

- Simulator flow equations
 - Role of simulation
 - Modeling fundamentals
 - Rock properties
 - Rock-fluid properties
 - PVT
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- The material balance equation and its deficiencies
 - Types of reservoir simulators
 - Data requirements
 - Simulation steps
 - Selection of model and data preparation
 - Construction of a reservoir simulation model
 - Gathering data for a reservoir simulation model
 - Utilization of core analysis
 - Pressure data
 - Black oil PVT
 - Relative permeability
 - Capillary pressure

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- Model initialization
 - Compositional modelling
 - Equations of state and compositional modeling
 - Well models
 - History matching
 - Forecasting
 - Sample problems

- Production and injection data
- Completion data
- Grid systems
- Primary reservoir engineering
- Pressure transient tests
- Material balance studies