MAESTRO CONSULTANTS

ADVANCED RESERVOIR SIMULATION

COURSE OUTLINE 2020

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TRAINING TITLE

ADVANCED RESERVOIR SIMULATION

VENUE

Dubai, UAE

DURATION

5 Days

DATES

19 - 23 July 2020

PRICE

US$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet daily.

TRAINING INTRODUCTION

Dynamic reservoir models are important when investigating reservoir behaviour, optimising reservoir performance, designing complex wells, estimating uncertainties and providing the basis for risk management. New developments, such as unstructured gridding, combined with new simulation techniques eliminate most of the drawbacks of conventional simulation methods and make predictions more reliable. The participants will learn about various algorithms, concepts and possible uses of reservoir simulators.

TRAINING OBJECTIVES

By the end of this course, participant will be able to:

- Apply the principles of reservoir engineering to numerical modeling
- Set up, run, and analyze the results for single well, pattern and full-field models
- Prepare fluid and rock property data in the manner required for simulation studies
- Identify and eliminate causes of numerical problems
- Perform a history match
- Use the matched model to predict future performance under a variety of assumptions

TRAINING AUDIENCE

This course is designed for experienced reservoir engineers. Attendees should have a basic knowledge of reservoir simulation, stochastic modelling, upscaling and some experience in the use of commercial reservoir simulators.

COURSE OUTLINE

- History and classification of reservoir simulators
- Modeling concepts,
    - The concept of grid blocks and time steps
    - Consequences of discretization
    - Explicit and implicit functions
    - Treatment of vertical saturation and pressure distributions
    - History matching
    - Well management
    - Solution methods
- Review of fluid properties for simulation - black-oil properties, equation of state modelling
- Rock properties and saturation functions - porosity, permeability, compressibility, relative permeability, capillary pressure, compaction, correlations
- Designing the reservoir model
    - Checklist for model design
    - Selecting the number of dimensions
    - Simplification of complex problems
    - Representation of reservoir fluids
    - Representation of reservoir rock
    - Well models – coupling between well and reservoir
- Selecting Reservoir –Rock And Fluid Properties Data
    - Data required for model construction
    - Sensitivity of results to data accuracy
    - Porosity and permeability
    - Assignment of rock property distributions to the simulator
    - Capillary pressure and relative permeability
    - Fluid properties
    - Establishing initial pressure and saturation distributions
- Selecting grid and timestep sizes
    - Criteria for selecting gridblock size
    - Selection of gridblock size

    - Example grids
    - Selection of timesteps
    - Limiting numerical dispersion
    - Grid orientation
    - Cost consideration
- Selecting the numerical solution method
    - Terminology
    - Formulating the equations
    - Formulation options
    - Numerical dispersion
    - Choosing the formulation option
    - Matrix equations
    - Solution methods
    - Selecting the equation-solving technique
- Well management: designing and controlling production parameters
    - Overall design of a well-management routine
    - Logic structure
    - Logic sequence
    - Individual well behavior
    - Operations conditions
    - Data requirment
    - Upgridding and upscaling
- General purpose formulation and discretisation methods used for black-oil and EOS compositional simulators
- Gridding - structured and unstructured gridding approaches, Cartesian grids, corner point grids, Voronoi grids
- Modelling structural elements in simulation - vertical and sloping faults, channels, etc…
- History matching
    - Objectives of matching historical reservoir performance
    - Strategy and plans for history matching
    - Manual adjustment of history- matching parameters
    - Examples of adjustment required in history matching
    - Special considerations in history matching
    - Automatic history matching
- Compositional reservoir simulation
- Forecasting future performance
    - Planning the prediction cases to be run
    - Preparation of input data for predictions

    - Review and analysis of predicted performance
    - Evaluating and monitoring predicted performance
- Simulating special processes
    - Compositional simulation
    - Miscible displacement
    - Chemical and polymer flooding
    - Steam stimulation and steam drive
    - In situ combustion
    - Special data requirement
- Simulation of fractured reservoirs - numerical model, matrix-fracture exchange, recovery processes

Application on ECLIPSE software

TRAINING CERTIFICATE

MAESTRO CONSULTANTS Certificate of Completion for delegates who attend and complete the training course

METHODOLOGY

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of "real life" issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.