ADVANCED RESERVOIR SIMULATION

TRAINIT ACADEMY

DRPT107
Drilling, Reservoir & Petroleum Training

COURSE TITLE

ADVANCED RESERVOIR SIMULATION

COURSE DATE/ VENUE

09 – 13 November 2020

Singapore

COURSE REFERENCE

DRPT107

COURSE DURATION

05 Days

DISCIPLINE

Drilling, Reservoir & Petroleum Training

COURSE 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.

COURSE OBJECTIVE

Upon successful completion of this course, the delegates will be able to:

- ✓ Apply the principles of reservoir engineering to numerical modelling
- ✓ Set up, run, and analyse 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

COURSE 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 CONTENT

History and classification of reservoir simulators

Modelling 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 behaviour
- Operations conditions
- Data requirement
- 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
- Making a smooth transition from history to 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

COURSE CERTIFICATE

TRAINIT ACADEMY will award an internationally recognized certificate(s) for each delegate on completion of training.

COURSE FEES

$5,750 per Delegate. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

COURSE METHODOLOGY

The training course will be highly participatory and the course leader will present, guide and facilitate learning, using a range of methods including formal presentation, discussions, sector-specific case studies and exercises. Above all, the course leader will make extensive use of real-life case examples in which he has been personally involved. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Case studies & Practical Exercises
- 10% Role Play
- 10% Videos, Software or Simulators (as applicable) & General Discussions