



Summary

This course provides a practical, integrated approach to characterising, classifying, analysing and modelling natural fractures. It uses lectures, modelling software and field examples to deliver an understanding of: geomechanics; the building and use of simple conceptual and more complex finite difference models; and the impact of fractures on well and reservoir productivity and recovery.

Learning Outcomes

Participants will learn to:

1. Characterise the presence or influence of fractures from a multitude of data sources (e.g. openhole logs, core, image logs, mud losses, PLT's, well tests and production performance).
2. Construct simple conceptual models of fracture origins, types and distributions for use as input to reservoir modeling.
3. Plan preliminary proposals for selecting the optimal modeling process for specific modeling objectives.
4. Develop simplified implicit fracture property models (i.e. fracture porosity, fracture permeability and sigma) in geocellular modeling packages.
5. Integrate simplified fracture properties into a finite difference simulator.
6. Evaluate fracture / matrix fluid exchange mechanisms of imbibition and gravity drainage.
7. Instigate and run a finite difference simulator in dual porosity / dual permeability mode.

Duration and Training Method

Four-day classroom based, with worked examples, hands-on exercises (some using Petrel and Eclipse) and discussion.

Who Should Attend

The course is designed for practicing mid- to senior- level geologists and reservoir engineers. Geophysicists and petrophysicists aware of reservoir modeling techniques would also benefit.

Prerequisites and Linking Courses

For geologists with a working knowledge of reservoir modeling packages (Petrel, RMS, etc) or for Reservoir engineers with a working knowledge of reservoir simulators (Eclipse, VIP, etc), this class would be of great benefit. For those who are unfamiliar, taking N954 (Enhanced Oil and Gas Recovery) may be of benefit, but not essential. Linked to this class, relating to reservoir performance, are N942 (Gas Condensate Reservoir Engineering including HPHT) and N936 (Reservoir Engineering Principles and Practice).

Course Content

- Basics (What is a fractured reservoir, typical attributes and behaviours, economic impact)
- Origin and characteristics of fractures (classification and fill types, modes of formation, stresses and



N923: Fractured Reservoir Characterisation and Modelling

Instructor(s): Sven Tiefenthal and Tim Wynn

4 Days

Competence Level:
Skilled



Classroom Course

rock failure, systems – natural, regional, fold / fault related)

- Sampling and analysis of natural fractures (Detection, density, aperture, distribution, orientation, permeability, sets, type and fill)
- Geomechanics (Rock properties, failure criteria, influence of in-situ stresses)
- Modelling (Geocellular reservoir models, calculating fracture permeability in a property grid, analytical effective fracture permeability tensor, fracture matrix interaction, percolation theory, fracture system connectivity, representative elementary volumes, discrete fracture networks, upscaling)
- Dynamic data and simulation (rock properties, well testing and productivity, recovery mechanisms, introduction to dual porosity and dual permeability simulator modes, introduction to streamline simulators and discrete fracture network modelling, management of fractured reservoirs)