NATURALLY FRACTURED RESERVOIR MODELLING AND SIMULATION FOR THE ENERGY TRANSITION (RES61)

Level: Advanced / Specialised

Instructor: Sebastian Geiger

This course addresses the key concepts and challenges encountered when modelling simulating naturally fractured reservoirs and will provide practical guidelines for creating meaningful reservoir simulation models across a range of subsurface reservoir applications that support the transition to a sustainable low-carbon energy future.

DESIGNED FOR YOU, IF YOU ARE...

• An experienced reservoir engineer working on naturally fractured reservoirs, wishing to refine your expertise in modelling and simulating these complex reservoirs, specifically in the context of the energy transition.

HOW WE BUILD YOUR CONFIDENCE

• Discuss how and why fractured reservoirs matter for the energy transition
• Examine how oil and gas expertise for naturally fractured reservoirs can be applied to other subsurface applications such as CCUS and geothermal energy
• By using case studies, you will review the challenges encountered during the characterisation and operation of naturally fractured reservoirs
• Modern reservoir modelling approaches for naturally fractured reservoirs will be discussed (not specific to certain software packages)
• You will learn how to quantify the fundamental processes that drive fluid flow in naturally fractured formations (incl. simple exercises)
• You will explore the concepts available in modern reservoir simulation packages and discuss their advantages and disadvantages when modelling single- and multi-phase flow processes in naturally fractured reservoirs
• You will understand how dynamic data can be used to calibrate fractured reservoir models

THE BENEFITS FROM ATTENDING

By the end of this course, you will feel confident in your understanding of:

• Why fractured reservoirs are important for the energy transition

- State-of-the-art naturally fractured reservoir modelling
- Creating and upscaling fracture network models
- The physics of multiphase flow in naturally fractured formations
- Running dual-porosity and dual-permeability models
- Using assisted history matching techniques to forecast future production

TOPICS

- The role of naturally fractured reservoirs in the energy transition (e.g., geothermal energy or CCUS)
- Introduction to naturally fractured reservoirs and their performance
- Heat and mass transfer in naturally fractured reservoirs
- Fracture network modelling and upscaling
- Principles of fluid flow in fractured formations
- Reservoir simulation using dual-porosity and dual-permeability models
- Calibrating fractured reservoir models using dynamic data

INSTRUCTOR:

Sebastian Geiger is Professor for Sustainable Geoenergy at Delft University of Technology. Previously he was Director of Research for the School of Energy, Geoscience, Infrastructure and Society at Heriot-Watt University and Director of the Institute of GeoEnergy Engineering at Heriot-Watt University. He spent time as a visiting researcher at the Australia National University, Imperial College London, and Aramco Research Centre in Houston, and was a post-doctoral researcher at ETH Zurich. Sebastian's research interests include the characterization, modelling, and simulation of naturally fractured (carbonate) reservoirs across all scales, with applications to hydrocarbon production, CCUS, and geothermal energy. He has authored or co-authored more than 190 technical papers and edited one book.

Sebastian holds a Ph.D. degree in Computational Geology from ETH Zurich and an M.Sc. degree in Hydrogeology from Oregon State University. He is a member of EAGE, SPE, and Interpore Society. Sebastian received the 2017 Alfred Wegener Award from the EAGE for his pioneering research into carbonate reservoir modelling and simulation. He was elected as a Fellow of the Energy Institute in 2019 and as a Fellow of the Royal Society of Edinburgh, Scotland's Academy for Sciences and Letters, in 2020.