CONTINUING EDUCATION

4-day intensive course

Geomechanics for Oil & Gas

Targets

The course is intended for drilling professionals, engineers and geologists who wish to acquire geomechanics basics for reservoir exploitation.

The course is delivered in English.

Prerequisites

Basic knowledge of rock mechanics.

Certification

A certificate of attendance is issued at the end of the course.

Overview

In the context of reservoir engineering, understanding of the behaviour of rocks is at the base of an efficient exploitation of the underground resources, from conventional and unconventional reservoirs.

This course aims to present the main aspects of the mechanics of rocks and their response to multiphysical actions such as those induced during the exploitation of underground reservoirs, and to determine and understand the parameters to be used according to the chosen constitutive model.

The laws of behavior of geomaterials (e.g., isotropic and anisotropic elasticity, elastoplasticity) constitute the foundations of geomechanics. They will be addressed in connection with the establishment of experimental programs for the determination of material parameters.

A particular focus will be put on coupled multiphysical problems that are key for the borehole stability, in particular the chemo-hydro-mechanical coupling.

Finally, unconventional reservoirs and the related challenges will be presented.

Objectives

- Understand and evaluate the behaviour of rocks subjected to multiphysical actions and their importance of reservoir exploitation
- Acquire and use the main constitutive laws for isotropic and anisotropic geomaterials
- Be able to determine from experimental results the mechanical parameters appropriate to the adopted constituent model
- Understand the possibilities and challenges related to the exploitation of unconventional reservoirs.

CONTINUING EDUCATION

4-day intensive course

Geomechanics for Oil & Gas

Trainers

Prof. Lyesse Laloui
École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Dr. Eleonora Crisci
Nesol - Numerical Engineering Solutions, Switzerland

Dr. Aldo Madaschi
Nesol - Numerical Engineering Solutions, Switzerland

Methods

- Optimal balance between theory and practice (laboratory test results elaboration)
- The training is based on cutting-edge scientific achievements
- Case studies based on leading international analysis

Format

- Intensive and high-density course
- Duration : 4 days
- Attendance : 4 days

Program

PART A - Introduction (Day 1)

- Definition of the objective and course methodology
- The understanding of the main geomechanical aspects for reservoir exploitation

PART B – Constitutive laws (Day 1)

- Total and effective stress definition
- Elasticity (linear elasticity, isotropic and anisotropic elasticity)
- Elasto-plasticiy (perfect plasticity, hardening)
- Failure criteria and rock strength anisotropy

PART C – Experimental testing (Day 2 & 3)

- Laboratory testing for hydro-mechanical characterization
- Rock compressive and tensile strength, permeability
- Determination from experimental testing of the parameters to adopt in consitutive laws
- Parameters estimation from gephysical logs

PART D – Chemo-mechanical aspectes (Day 3 & 4)

- Identification of the field stess state
- Fluid-rock interaction and stability issues
- Sand production

PART E – Unconventional reservoir (Day 4)

- Challenges related to gas-shale exploitation
- Gas-shale hydro-mechanical behaviour
- Hydraulic fracturing to enhance reservoir production

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