Advanced Petroleum Geomechanics

PetroGem INC.
REDEFINING QUALITY

Geomechanics Training Series

About the Course

This course provides an advanced overview of petroleum geomechanics and reviews major geomechanical challenges in oil and gas industry. It will start with a brief review of fundamentals of petroleum geomechanics and introduces different sources of geomechanical data (e.g., cores, logs, field tests, seismic surveys, drilling, fracturing, microseismic and more) and the best practices for their integration. Advanced topics in rock mechanics such as non-linear and plastic behavioral rock models, rock anisotropy, and their characterization will be discussed in detail. Construction of advanced Mechanical Earth Models (MEMs) with especial emphasis on data uncertainty and geostatistical considerations will be presented. Different aspects of reservoir-scale modeling and coupling of geomechanical models with reservoir simulators as well as applications of these models for assessment of reservoir compaction, surface subsidence, leakage and induced seismicity will be reviewed thoroughly. Geomechanical modeling for wellbore stability analysis, drilling optimization, completion and sand production will also be presented. Fundamentals of hydraulic fracturing and fracture design and diagnosis as well as the role of DFN will be reviewed. The course will also address the key geomechanical aspects of unconventional plays (e.g., shales) such as brittleness, natural fractures and anisotropy and their influence on optimization of hydraulic fracturing. Several exercises and case studies will help the participants to gain a profound understanding of the presented materials. An online blog dedicated to the course will ensure that the participants will take their learning experience beyond the classroom.

Designed for

The course has been developed for geoscientists, engineers and project managers who need to use geomechanics in their everyday practices in petroleum industry. Participants are expected to have a proper knowledge of the fundamentals of geomechanics.

QualityConsultingServices **FocusedTrainingCourses** **AdvancedDataManagement**

Course Outline

Day 1

- Introducing different sources of geomechanical data
- Behavior of non-elastic and anisotropic rocks
- Application of advanced sonic and seismic data for geomechanical characterization
- Using drilling and hydraulic fracturing experience for geomechanical characterization
- Methodologies for in-situ stress characterization with emphasis on SHmax
- Data quality control and challenges of data integration from various sources

Day 2

- Introducing specialized MEMs for different geomechanical practices
- Data population and data uncertainty analysis for MEMs
- A review of geomechanical models from analytical to commercial numerical models
- Geostatistical modeling and probabilistic analysis for sensitivity assessment
- Coupled modeling of geomechanics and reservoir simulations

Day 3

- Reservoir-scale geomechanical modeling for compaction and subsidence evaluation
- An integrated workflow for caprock integrity and reservoir containment assessment
- Geomechanical analysis of in-situ thermal operations
- Image log analysis and its application for borehole stability analysis
- Borehole stability analysis and mud window design

Day 4

- Geomechanical aspects of completion and sand production analysis
- Principals of hydraulic fracturing analysis and design
- Key geomechanical aspects of shale plays (fractures, brittleness, anisotropy)
- Natural fractures characterization and DFN modeling
- Induced seismicity and role of microseismic monitoring

You Will Learn About

- Advanced rock mechanics topics such as non-elastic constitutive models and anisotropy
- Methodologies for geomechanical data acquisition and integration from different sources (cores, logs, lab and field tests, drilling, fracturing, seismic, microseismic, etc.)
- Construction of 3D MEM and topics of data population, uncertainty analysis and geostatistical modeling
- Coupled geomechanics-fluid flow modeling and its application for reservoir-scale geomechanical analysis
- Wellbore stability analysis and drilling experience review
- Geomechanics of completion and wellbore stability analysis
- Hydraulic fracturing analysis and design and DFN modeling
- Geomechanical aspects of unconventional (shale) plays

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