Sand Production Prediction and Control

PetroGem INC.
REDEFINING QUALITY

Geomechanics Training Series

About the Course

In this course, along with different causes and mechanisms of sand production, different modeling and controlling approaches for sand management will be discussed. In addition to fundamentals of rock mechanics and different rock behavioural models, other essential concepts for sand production analysis such as the stress concentration and radial flow around the borehole and perforations, solid lift under fluid pressure will be reviewed. The processes of data collection, laboratory and field testing to acquire rock properties and in-situ stresses will be discussed in detail. The course will review application of different modeling techniques including physical, empirical, analytical, and numerical models for sand production prediction. Various factors influencing sand production such as completion approach, water breakthrough, operational condition and reservoir compaction will also be reviewed. Different sand management techniques will be presented and different completion options such as gravel packs, slotted liners and screens will be discussed in detail. 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 doors.

Designed for

Asset managers and engineers and technologists in the fields of production, completion, reservoir management. The participants are assumed to have limited background in petroleum geomechanics.

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Course Outline

Day 1

- Overview of sand production, its consequence and management
- Elements of integrated sand production control
- Fundamentals of rock mechanics for sand production analysis
- Tensile/shear/compaction failure modes and constitutive models
- Stress perturbation and radial flow around perforation and boreholes
- Review of radial flow and formation damage
- Concepts of solid lift/flow and grain size role and analysis

Day 2

- Rock properties characterization using lab/log/field data
- Characterization of different in-situ stresses components
- Mechanisms of sand production
- Physical modeling and laboratory testing
- Onset, transient and volumetric modeling of sanding
- Empirical and analytical modeling of sand production

Day 3

- Numerical modeling methods: continuum and discontinuum approaches
- Roles of completion method, water breakthrough, operational condition, reservoir compaction in sanding
- Sand management techniques: exclusion, screenless and surface control
- Gravel pack and preformation design in cased holes and open hole grave packing
- Slotted liners and wire-wrapped and expandable screens
- Horizontal well completion for sand control

You Will Learn About

- Causes, mechanisms, modeling and controlling of sand production
- Fundamentals of rock mechanics required for sanding analysis
- Concepts of stress concentration, radial flow and solid lift/flow
- Rock characterization workflows for sand production modeling
- Physical, empirical and analytical modeling approaches for sanding
- Continuum and discontinuum numerical modeling of sand production prediction
- Influences of completion, water production and reservoir compaction on sanding
- Different sand management techniques
- Sand production controlling methods: gravel packs, slotted liners, different screens
- Completion for sand control in horizontal wells

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