2018 Geomechanics for Unconventional & Tight Reservoirs
Training Course Information

Geomechanics – in both completions and drilling operations – has become a critical technology in the development of Unconventional Plays. This course presents the basics of oil field geomechanics and its application to unconventional developments; specifically, the role of stress, pore pressure, mechanical properties, and natural fractures on hydraulic fracturing operations.

The first portion of the course will focus on the fundamentals of oil field geomechanics including stress, mechanical properties and failure. Common geomechanics applications (both near-wellbore and reservoir geomechanics) will be introduced. The second part of the course will focus on hydraulic fracturing for Unconventional Resources with an emphasis on the characterization, geomechanics, modeling and field aspects of Unconventionals hydraulic fracturing (hydraulic fracturing in heterogeneous rock masses with the presence of discontinuities and weakness planes).

After the course, the attendee will fully understand the necessary basics of geomechanics and be familiar with the geomechanical issues for common petroleum applications, especially hydraulic fracture stimulations in Unconventional Plays. In addition, the course will present the key issues in the specification and QC of a geomechanics evaluation or testing program.

Who Should Attend

The course is intended for geoscientists, reservoir engineers, drilling engineers, and completions engineers with little or no background in geomechanics and currently working Unconventional Resources.

About The Instructors

The primary instructor is Dr. Neal Nagel. Neal has 30+ years of industry experience and has provided geomechanics consulting and training since 2009. Neal is the Chief Engineer and co-founder of OilField Geomechanics LLC. He previously worked for 20 years with ConocoPhillips as a world-wide geomechanics specialist. He has taught extensively over his career as well as given many invited presentations – including serving as an SPE Distinguished Lecturer in 2004 and 2016 and giving a keynote presentation at the 2014 SPE Hydraulic Fracturing Technical Conference. Neal was also chief editor of the 2010 SPE Monograph on Solids Injection, is chairman of the SPE Geomechanics Technical Section, and has written more than 50 peer-reviewed and conference papers, including more than 20 related to Unconventional Play geomechanics.

The second instructor will be Dr. Marisela Sanchez-Nagel. Marisela is president and principal engineer at OilField Geomechanics LLC. She has more than 25+ years of industry experience having worked for Intevep, the technology arm of PDVSA; as President of Global GeoSolutions, a geomechanics consulting company in Latin America; for GMI; and as General Manager and President of Itasca Houston from 2007 to 2014. Marisela was a 2012-2013 SPE Distinguished Lecturer and has presented at numerous geomechanics schools throughout North and South America.

Part 1. GEOMECHANICS FOR PETROLEUM APPLICATIONS

I. Principles of Stress and Strain

A) Basics of stress/strain and Mohr circles; B) Effective stress concepts and the importance of pore pressure; C) Stress field variations and structural effects; D) Stress measurements and analysis; and E) Examples and exercises

II. Pore Pressure Evaluation

A) Basic concepts and causes of over pressure; B) Analysis concepts: NCT, Bowers, Centroid-Effect; C) Analysis workflow; and D) Examples and exercises

III. Mechanical Rock Behavior

A) Mechanical properties (elasticity, etc.); B) Failure and beyond; C) Influence of faults and fractures; D) Laboratory vs. log vs. field data; and E) Examples and exercises

IV. Geomechanical Modeling and Workflow

A) Concepts and tools; B) 1D/2D modeling and 3D modeling; and C) Example geomechanics workflow

V. Review of Main Petroleum Geomechanics Applications

A) Wellbore stability; B) Sanding; C) Solids (cuttings) injection; and E) Monitoring/Field/lab testing

Part 2. GEOMECHANICS FOR UNCONVENTIONALS

VI. Introduction to Unconventional Developments

A) On the importance of Unconventionals world-wide; B) Common play characteristics; and C) Challenges in general and challenges from a geomechanics point-of-view

VII. Shale and Shale-Like Properties and Behavior

A) What is shale?; B) Shale properties; and C) Shale types; 'Brittle' vs. ductile behavior

VIII. Naturally Fractured Reservoirs (NFRs)

A) Concepts, characterization, and modeling; B) Discrete Fracture Network (DFN) issues; C) NFR mechanical behavior; and D) Influences on drilling and stimulations

IX. Microseismicity

A) Basics; and B) Integration for Interpretation

X. Unconventional Reservoir Quality Evaluations

A) Basic concepts; and B) TOC, porosity/permeability, natural fractures, pressure, stresses and mechanical properties as quality indicators

XI. Hydraulic Fracturing – For Conventional and Unconventional Plays

A) Basics; B) Models and design; C) Frac QC; D) Conventional models in unconventional developments: and E) Workflow and examples

XII. Unconventional Completions: Critical Geomechanical Aspects

A) Geomechanics of shale plays; modeling and shale completions; B) Stress shadows, stage spacing, and stress rotations; C) Interactions with Natural Fractures and weakness planes; D) SRV and 'Brittleness'; E) Landing location and perforation strategies; F) Multi-well completions (Zipper fracs, etc.); G) Impact of operational parameters: H) Workflow and key issues from published work and numerical simulations; and I) Field examples.

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