EGI Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

TRAINING COURSES

Introduction to Geomechanics in Low Mobility Plays

Available to EGI Corporate Associate Members

Introduction

- Historical Background & Impact of Stimulation Decisions

Key Formation Properties of Low Mobility Plays

- Storage
- Permeability
- Stimulation Requirements

Geomechanical Properties – Introduction

- Stress
- Strain
- Strength
- Deformation Properties (E, ν …)
- Laboratory Measurements
- Logging Analyses
- Field Interpretation

Introduction to Hydraulic Fracturing & Implications for Low Mobility Situations

- Principles for Single, Planar Fractures
- Multiple Interacting Fractures
- Fluid Requirements (volumes, sensitivity, etc.)
- Geologic Considerations
- Natural Fractures
- Stress Contrast
- Post-Peak Behavior
- Lithologic Considerations

Completing These Wells

- Near-wellbore Considerations

Additional Issues

- Wellbore Integrity
- Reduced Volumes
- Nonaqueous Fluids
- Air Quality

Instructor:

John McLennan, Ph.D.
Senior Research Scientist,
USTAR Associate Professor
Chemical Engineering

Course Structure
Lectures, presentation & materials

Duration
Up to 4 days

Location
EGI's Salt Lake offices or your location.

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Research Interests

Energy extraction related to:

- Exploration
- Drilling
- Completion
- Stimulation
- Production

John McLennan, PhD

Associate Professor Chemical Engineering

John is a USTAR Associate Professor in the Department of Chemical Engineering at the University of Utah. He holds a Ph.D. in Civil Engineering from the University of Toronto, Canada (1980). His experience extends to petroleum service and technology companies. He worked for Dowell Schlumberger in Denver, Tulsa and Houston; later, with TerraTek in Salt Lake City, Advantek International in Houston, and ASRC Energy Services in Anchorage. He has worked on coalbed methane recovery, mechanical properties determinations, produced water and drill cuttings reinjection, as well as casing design issues related to compaction. John's recent work has focused on optimized gas production from shales and unconsolidated formations.

Shale Gas Phase 2

The three key elements for a successful low permeability reservoir play are gas-in-place, heterogeneities providing permeability in excess of the matrix, and successful stimulation. EGI has been addressing the first of these directly, performing fundamental measurements to indicate the formation and reservoir parameters that govern recoverable gas-in-place. Storage mechanisms (adsorption, compressibility, and dissolution) were determined as functions of gas species, pressure history (reliable lost gas measurements), moisture content, and mineralogy. Without reliable gas-in-place forecasts, and the ability to identify desirable settings in advance, play development is expensive and prolonged.

Stimulating Low Permeability Reservoirs

In any low permeability formation – shale, tight sands, oil shale, geothermal, etc. – effective stimulation entails developing extensive, interconnected fracture systems with adequate conductivity. This effort leverages from projects awarded to the Department of Chemical Engineering by RPSEA for development of new generation simulators. This simulation methodology interrelates formation heterogeneity (stresses, fractures, high permeability streaks) with simulations of the growth of fracture systems during injection; and represents production from this specific, complex fracture network – next generation integrated geologic and production simulation.

Enhanced Geothermal Systems

EGI's geothermal group is engaged in development work for Enhanced Geothermal Systems. Hydraulic injection (either above or below fracturing pressure) is one method to develop an enhanced fracture system, providing surface area for exposure of liquids to elevated temperature en route to producing wells and subsequent conversion to usable energy. The key element of these systems is that they are engineered. Fractures are created with optimal morphology by exploiting the *in-situ* stresses and natural heterogeneity – engineering fracture growth for heat extraction.

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