Identifying Hydraulic Fracture Gradient and the Application of Geomechanics for Depleted Fields

Prior regulations suggested operators use a typical hydraulic fracture gradient of 0.9 psi/foot to establish maximum injection pressure. DOGGR now requires operators to conduct Step Rate Tests to identify fracture gradients dependent on location. Hydraulic fracture gradient varies in response to reservoir pressure and near wellbore pressure changes. Numerical modeling can be applied to anticipate these pressure changes, while direct field measurements can be applied to measure fracture gradient.

This presentation will first discuss variations in fracture gradient with reservoir pressure, and analytical and numerical techniques to evaluate fracture gradient. Ms. Wang will also describe advanced interpretation of step rate tests to obtain the fracture gradient. Finally, she will discuss the application of geomechanics to estimate reservoir compaction and subsidence during depletion.

Wenli Wang Bio

Ms. Wenli Wang is a Senior Geomechanics Engineer and Vice President of GeoMechanics Technologies. She holds a Master of Science degree in Petroleum Engineering from The University of Texas at Austin, and another Master of Science degree in Engineering Mechanics from Tsinghua University, Beijing, China. Ms. Wang has over 10 years of experience in the oil, gas, and environmental engineering industry. Her technical areas of expertise include reservoir geomechanics, wellbore mechanics, compaction and subsidence analysis, well failure and wellbore stability analysis, waste injection design and management (drill cutting and waste water reinjection), hydraulic fracture model development and simulation, pressure transient analysis, and pore pressure and fracture gradient prediction in deep water environments.

Since 1994, GeoMechanics Technologies has provided cost effective and advanced technical services worldwide and has completed numerous multi-year research contracts for the US Department of Energy and other large organizations.