

Geomechanics without Logs: An Opportunity for Geomechanics Everywhere

Dr. Hamed Soroush
CEO of PETROLERN

Thursday May 26, 2022, 9 a.m. Central Time



Dr. Hamed Soroush, CEO of Petrolern, will speak on Thursday, May 26, 2022, at 9:00 a.m. Central time.

The topic is “Geomechanics without Logs: An Opportunity for Geomechanics Everywhere”

Abstract

Geomechanical characterization of rock formations is essential to ensure safe and cost-effective subsurface operations, including drilling, production, stimulation, and injection, for carbon storage, geothermal and oil and gas applications. The integrity of a borehole is directly dependent on the variation of geomechanical properties along the well and appropriate well and stimulation design. Also, reliable estimation of rock mechanical properties and in-situ stresses in reservoirs and the cap rock formations is critical for safe storage of CO₂ and minimizing potential environmental hazards related to fluid leakage and induced seismicity.

Several methodologies have been used to date to estimate in-situ stresses. Seismic-based methods offer the advantage of covering a larger volume of subsurface formations but include large uncertainties and do not provide sufficient vertical resolution. Log-based methods that are commonly used for geomechanical modeling rely on availability of costly well logs such as dipole sonic, image, density, porosity, etc., together with oversimplified models or correlations to estimate geomechanical characteristics. The main challenge, however, remains to be the typical absence of the required logs and the lack of them outside the pay zones. Logs are also rarely available in unconventional horizontal wells, where the lateral changes in the state of stress and rock properties is crucial to optimize the stimulation design. These limitations and shortcomings identify an essential requirement for new sources of data and innovative methodologies for geomechanical evaluations.

This presentation introduces a new approach to geomechanical modeling using drilling dynamics data together with advanced signal processing and physics-informed machine learning techniques to extract geomechanical information from the complex drill-bit vibration data. This methodology (Drilling Dynamics Geomechanics, DDG™)

provides the opportunity to develop high resolution geomechanical model for entire the well length regardless of well trajectory. It also provides the opportunity for real-time geomechanics and wellbore stability modeling while drilling. The new technology has been field-tested in 7 different onshore and offshore basins in the US and internationally including Utah FORGE.

Biography

Dr Hamed Soroush is an entrepreneur and geomechanics expert with more than 25 years of subsurface engineering experience in oil and gas, geothermal and carbon storage. He has conducted or managed more than 250 consulting and research projects worldwide. Hamed is the CEO of PETROLERN providing strategic planning, leadership, and technical support for development and commercialization of leading-edge and value-add technologies for subsurface energy production and storage. Prior to that, he held several positions with companies such as Dong Energy, Shell, Weatherford, Senergy, GMI, and CSIRO. His current technical focus is on sustainable development of geothermal energy and carbon storage projects with advanced geomechanical analysis. Hamed holds a BSc in Mining Engineering, an MSc in Rock Mechanics, and a PhD in Petroleum Engineering from Curtin University in Australia. He has published numerous journal and conference papers and has been selected as SPE Distinguished Lecturer three time in 2012, 2017 and 2020.