

Geomechanics In Shale Plays – What Do We Know?

See Hong Ong¹

¹Baker Hughes, USA

ABSTRACT

Geomechanics has often been cited as a key requirement for effective shale reservoir developments; however, the exact nature of the geomechanical contribution is often ill-defined. This presentation aims to provide a high-level understanding of how geomechanics can be used to improve the characterization and engineering of shale plays.

Geomechanics, the science of evaluating the interplay between stress, pressure, and rock mechanical properties, is becoming a regular design tool for many operators when drilling and completing shale and other unconventional plays. These plays present nontrivial completion challenges which, if the geomechanical influences are inadequately understood and addressed, can yield significant downside risks and sub-optimal well performance. Additionally, the need to sustain production with relatively high well deliverability, further imposes technical and operational constraints on the stimulation technique in ultra-tight formations.

This presentation extends beyond the traditional applications of geomechanics in hydraulic fracturing to include critical elements necessary for the design and optimization of re-fracturing as well as multi-staged hydraulic fracturing stimulation in horizontal completions. Additionally, the complicated and variable geomechanical impact of natural fractures and weak-planes during hydraulic fracturing will also be presented, along with a review of shear stimulation, micro-seismicity and fracture complexity concepts. Other geomechanical issues such as brittleness, ‘fracability’ and stress interference, their implications and influences on stage spacing and stimulation effectiveness, will also be discussed.