

Rapid Assessment of Hydraulic Fracture Extents in Unconventional Completions Using Crosswell Low-Frequency Distributed Acoustic Sensing

Prof. Smith Leggett
Texas Tech University

Thursday, June 1, 2023, 9 a.m. Central Time



Dr. Smith Leggett, Assistant Professor, Texas Tech University, will speak on Thursday, June 1, 2023, at 9:00 a.m. Central Time.

The topic is “Rapid Assessment of Hydraulic Fracture Extents in Unconventional Completions Using Crosswell Low-Frequency Distributed Acoustic Sensing.”

Abstract

Crosswell low-frequency distributed acoustic sensing (LF-DAS) measurements have proven invaluable in determining the occurrence of frac hits along offset wells. However, accurately estimating the final dimensions of hydraulic fractures in multistage unconventional completions has remained a challenge. This presentation introduces a simple yet effective method to rapidly estimate fracture extents using crosswell LF-DAS.

The zero strain-rate location method, developed through laboratory experiments and numerical modeling, allows for the extrapolation of final fracture extents based on the instantaneous fracture propagation velocity observed during a frac hit. This method provides a quantitative estimate of fracture geometry, contributing to a comprehensive understanding of hydraulic fracture behavior.

Through two field cases, namely a single cluster stage in the Montney formation and a multi-cluster stage of an Austin Chalk completion, this presentation demonstrates the practical application of the zero strain-rate location method. The applications unveil new opportunities for improved hydraulic fracture diagnostics and enhanced

understanding of fracture propagation in unconventional reservoirs. Suggestions are provided for how to use the results to improve unconventional completions.

Biography

Dr. Smith Leggett is an Assistant Professor at Texas Tech University in Lubbock, TX. He has demonstrated expertise in distributed fiber optic sensing for hydraulic fracture diagnostics, including acoustic, strain, and temperature sensing. Dr. Leggett has had the opportunity to participate in multiple projects deploying fiber optic sensors downhole to characterize hydraulic fractures, including the DOE-funded Austin Chalk Eagle Ford Field Laboratory. In addition to his academic experience, Dr. Leggett has seven years of industry experience in production engineering, operations, and research, the majority of which was with Occidental Petroleum. He obtained his Ph.D. in Petroleum Engineering from Texas A&M University in College Station and holds a B.S. in Mechanical Engineering from the University of Texas at Austin.