

Coiled Tubing Fiber-Optic Monitoring and Tracer Diagnostics in an Enhanced Geothermal System

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Dr. Smith Leggett is an Assistant Professor in the Bob L. Herd Department of Petroleum Engineering at Texas Tech University and Executive Director of the Southwest Petroleum Short Course (SWPSC). Prof. Leggett will speak on Thursday, February 19, 2026, at 9:00 a.m. Central Time. The topic is “***Coiled Tubing Fiber-Optic Monitoring and Tracer Diagnostics in an Enhanced Geothermal System.***”

Abstract

Quantifying circulation efficiency and heat sweep in enhanced geothermal systems (EGS) requires diagnostics that resolve fracture-scale flow pathways. This webinar presents results from an August 2025 circulation test at Utah FORGE using retrievable coiled tubing-deployed fiber-optic sensing combined with integrated tracer and production diagnostics.

Distributed temperature and acoustic sensing (DTS/DAS) installed in the 16B producer identified inflow zones, thermal transients, and microseismic activity during circulation operations, while providing key operational lessons for survivable deployment in high-temperature environments. An integrated diagnostic suite was applied, including fiber-optic inflow profiling, spinner flowmeter logging, chemical tracer tests, and downhole pressure and temperature monitoring. Results revealed dominant fracture connections, evidence of crossflow behavior, and steadily improving production efficiency from ~25% to 65%. These findings demonstrate a practical framework for guiding reservoir simulations that predict long-term doublet heat sweep efficiency and informing future EGS reservoir development.

Biography

Smith Leggett is an Assistant Professor in the Bob L. Herd Department of Petroleum Engineering at Texas Tech University and Executive Director of the Southwest Petroleum Short Course (SWPSC). He leads the DOE-funded Utah FORGE project Integrated Diagnostics for Interpreting Doublet Heat Sweep Efficiency (ID²), focused on combining distributed fiber-optic sensing, tracer testing, and production profiling to improve interpretation of enhanced geothermal system performance. Dr. Leggett is also the founder and lead principal investigator of the Texas Tech Gas Lift Consortium, advancing applied research in multiphase flow, artificial lift, and subsurface energy systems.