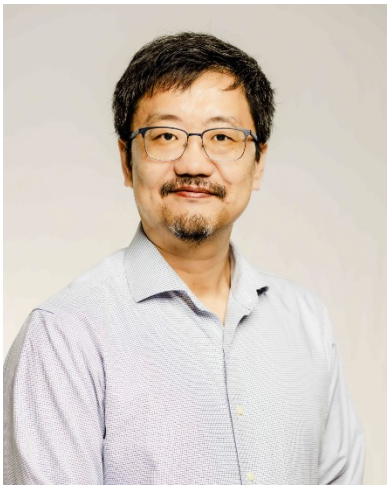
Large-Scale Bedding Plane Slippage and Its Impact on Hydraulic Fracturing: Integrated Analysis from Field Observations in the Eagle Ford and Austin Chalk Formations

Prof. Ge Jin
Colorado School of Mines

Thursday, July 9, 2026, 9 a.m. Central Time



Dr. Ge Jin is an Associate Professor of Geophysics and Co-director of the Reservoir Characterization Project at Colorado School of Mines (Mines). He will speak on Thursday, July 9, 2026, at 9:00 a.m. Central time. The topic is “Large-Scale Bedding Plane Slippage and Its Impact on Hydraulic Fracturing: Integrated Analysis from Field Observations in the Eagle Ford and Austin Chalk Formations.”

Abstract

In this talk, I will present the first documented field evidence of large-scale bedding plane slippage (BPS) induced by hydraulic fracturing operations in the Eagle Ford and Austin Chalk formations of southwest Texas. Using an integrated geophysical monitoring approach, including low-frequency Distributed Acoustic Sensing (LFDAS), surface-based microseismic monitoring, and time-lapse Vertical Seismic Profiling (VSP), we investigate the complex fracture dynamics and fluid migration pathways resulting from stimulation. LFDAS measurements reveal migrating dipole strain signals consistent with shear-mode fractures propagating parallel to the monitor well, interpreted as BPS events. Microseismic moment tensor analyses support this interpretation, identifying horizontal-slip events concentrated near the treatment and monitor wells. Additionally, time-lapse VSP data indicate the reactivation of pre-existing vertical fractures, correlating with BPS signals and suggesting fluid communication between bedding planes and natural fracture networks. Geomechanical modeling using the three-

dimensional Displacement Discontinuity Method (3D DDM) further validates that shear fractures along bedding planes can replicate observed LFDAS responses. These interactions between bedding planes and vertical fractures contribute to a more complex fracture network than anticipated, potentially enhancing reservoir connectivity and production performance. However, the findings also highlight potential inefficiencies and risks, including stage isolation due to conductive bedding plane and casing deformation due to shear displacement. This study underscores the need for adaptive completion design and well placement that account for natural fracture systems and bedding plane dynamics to optimize hydraulic fracturing efficiency and economic returns in similar unconventional reservoirs.

Biography

Dr. Ge Jin is an Associate Professor of Geophysics and Co-director of Reservoir Characterization Project at Colorado School of Mines. His research interests focus on applications of Distributed Fiber-Optic Sensing (DFOS) in geoscience and engineering, as well as seismic imaging and machine learning techniques. Dr. Jin has more than 70 publications and 12 granted patents. He received the ARMA Case Study Award in 2025, delivered the AAPG/SEG Distinguished Lecture in 2024, received the Best Paper award at the UrTeC conference in 2023 and 2024. Before joining Colorado School of Mines, Dr. Jin worked for five years as a research geophysicist at ConocoPhillips. Dr. Jin earned his Ph.D. in Geophysics from Columbia University and holds dual B.S. degrees in Geophysics and Computer Science from Peking University.