Bay Area Geophysical Society Seminar Series

Unconventional Signals in Unconventional Reservoirs

Dr. Ge Jin

Assistant Professor of Geophysics

Colorado School of Mines

November 22nd, 2021 5 PM PST -- Zoom Talk

Abstract:

Compared to traditional geophone arrays, DAS measurements enjoy much larger aperture, broader frequency response, and denser spatial sampling. DAS can make measurements in harsh environments that are not feasible by other means. The technology provides opportunities to discover values of signals that could not be observed or have been ignored previously in traditional geophone data. This presentation showcases three types of new signals recorded on DAS in unconventional wells during stimulation. The first signal is the near-field term of microseismic events. The near-field term manifests as the low-frequency signal between P and S arrivals. It is highly sensitive to moment tensor orientation and source time function. The second one is the guided wave trapped in low-velocity reservoir layers, which can be generated by microseismic events and perforation shots. The guided-wave signal can be used to invert for reservoir properties and constrain microseismic event depth. The third type of signal is the tube wave generated by in-well perforation shots. We find tube waves

decay rapidly in the stimulated borehole sections, with the decay rate closely related to near-wellbore conductivity and connectivity. All of these signals demonstrate significant potential to characterize unconventional reservoirs and add extra value to existing DAS acquisition projects.

Presenter's Bio:

Dr. Ge Jin is Assistant Professor of Geophysics and co-director of Reservoir Characterization Project (rcp.mines.edu) at Colorado School of Mines. His research mainly focuses on Distributed Fiber-Optic Sensing (DFOS) applications in Geophysics. He is also interested in machine-learning applications and seismic imaging. Dr. Jin is among the researchers who first recognized the valuable information in the low-frequency component of DAS data. He has been working on DFOS-related research projects since 2014. He authored dozens of publications and submitted 10 patents in this field. He currently leads a research group focusing on hydraulic fracturing and reservoir monitoring using DFOS measurements. He obtained his Ph.D. in Geophysics from Columbia University in the City of New York, and dual B.S. in Geophysics and Computer Science from Peking University. He worked as a research geophysicist in the oil industry for five years before joining Colorado School of Mines as a faculty member in 2019.

Zoom meeting information:

Zoom ID: 976 7695 5490

Password: BAGS4ever