Wei Fu – ITASCA Minneapolis

Geomechanics Engineer

Expertise

Fracture Mechanics, Rock Mechanics, Hydro-Mechanical Coupling, Hydraulic Fracturing, Computational Geosciences

Education

Ph.D. (Major: Civil Engineering, Minor: Mechanical Engineering), 2018
University of Pittsburgh, Pittsburgh, Pennsylvania, USA

M.Sc. (Tunnel and Underground Engineering), 2013
Southwest Jiaotong University, Chengdu, China

B.Eng. (Civil Engineering), 2011
Southwest Jiaotong University, Chengdu, China

Professional Affiliations

Member: American Rock Mechanics Association (ARMA), American Geophysical Union (AGU), International Society for Rock Mechanics (ISRM), Society of Petroleum Engineers (SPE)

Honors

Future Leader, American Rock Mechanics Association (2021)

Dr. N.G.W. Cook Ph.D. Dissertation Award, American Rock Mechanics Association (2020)

Outstanding Technical Reviewer Award, SPE Journal (2019)

Keynote Lectures

"Developing Upscaling Approach for Swarming Hydraulic Fractures Observed at Hydraulic Fracturing Test Site Through Multiscale Simulations," SPE Hydraulic Fracturing Technology Conference and Exhibition, The Woodlands, Texas, USA, 2020

Professional Experience

2021 – Present	ITASCA Minneapolis Geomechanics Engineer
2019 – 2021	Lawrence Livermore National Laboratory, Atmospheric, Earth, & Energy Division, Livermore, California Postdoctoral Research Associate
2018 – 2019	University of Pittsburgh, Department of Civil & Environmental Engineering, Pittsburgh, Pennsylvania Postdoctoral Research Associate
2016 – 2016	Shell International Exploration and Production, Inc., Department of Rock & Fluid Physics, Houston, Texas Geomechanics Postgraduate Intern

Project Experience

Numerical Modeling for Coupled Geomechanics and Fluid Flow: Developed numerical models using finite element/finite volume codes for multiscale simulations of hydraulic fracture swarms in unconventional reservoirs. Built discrete element models to examine the mechanisms of dyke propagation and interference. Built discrete element models to investigate the impact of heterogeneous natural fractures on hydraulic fracture trajectories in 3D.

Analytical Modeling: Derived new upscaling law from hydraulic fracturing mechanics to model excessively dense hydraulic fracture swarms at the field scale. Developed the first 3D analytical criterion from fracture mechanics to quantify the impact of natural fracture size, persistence, and strength on hydraulic fracture growth. Developed new analytical criterion to evaluate the potential of interference and coalescence of hydraulic fractures in unconventional reservoirs.

Laboratory and Field Experimentation: Designed and performed extensive laboratory experiments to reveal 3D hydraulic fracture patterns when encountering natural fractures. Investigated mechanical properties of Agra Red/Scioto sandstones and the impact of nanofluid additives on the time-dependent hydraulic fracture nucleation in rock samples. Investigated mechanical properties of cohesionless/cohesive fractures and host rocks using various experimental rock mechanics techniques. Characterized reservoir properties and the morphologies of subsurface natural/hydraulic fractures using well log data and microseismic data.

Tunneling and Underground Engineering: Developed numerical models to study the hydromechanical behaviors of tunnels influenced by fluid leaks, as well as structural defects and geological conditions. Developed numerical models to study the impact of tunnel excavation and blasting on existing tunnels and buildings. Conducted laboratory-scale experiments to study the dynamic response of soils to tunnel excavation.