

2023 ARMA Future Leader Webinar Series

Every Two Weeks on Fridays 9-10 AM MT



5th lecture: April 07, 2023

Please reach out to shahzad.roshankhah@utah.edu to get the Zoom meeting information.

Speaker: Wei Li

Title & Abstract:

4D computed tomography of granular force

Granular media constitute the most abundant form of solid matter on the Earth and other astronomical objects. When external forces are applied to granular media, the forces are transmitted in the media through a network of contacts force chains. Understanding the temporal evolution and spatial structure of these force chains constitute a fundamental goal of granular mechanics. For decades, our understanding of force chains has been derived from 2D experiments, using quasi 2D photoelastic particles of various shapes. Here, we introduce a new experimental technique, which integrates photoporomechanics (Li et al., 2021) into tomography, to observe the temporal evolution of 3D force chains under isotropic compression, triaxial shear and rotary shear. Our experimental study visualizes the allineation and intensification of 3D force chains as the external load changes from isotropic to triaxial shear and rotary shear. We also show that the fluctuation of the continuum scale shear stresses can be pinpointed to the grain scale buckling and reestablishing of a few force chains.

Biography:

Dr. Wei Li is an assistant professor at the New York State University at Stony Brook. He obtained his Ph.D. degree in 2019 under the supervision of Professor Herbert H. Einstein in the Department of Civil and Environmental Engineering at MIT. He then worked as a postdoctoral researcher with Professor Ruben Juanes at MIT. He is strongly interested in the geosystems centered on infrastructure and energy. His Ph.D. work focused on developing mathematical and experimental models to understand how the flow and dissolution create cavities, with applications to sinkhole hazard evaluation and enhanced oil production. In his postdoc research, he developed novel experimental techniques, such as photoporomechanics and 3d force chain tomography, to study the mechanics and physics of granular media and porous media.