

**Multiple research assistant and Ph.D. positions are available for students with multidisciplinary interests and experience in ultrasonics, mechanics-based modelling, and laboratory rock deformation/permeability testing.** The research involves one or more of the following: acoustic emission, ultrasonic data acquisition and processing, working with servo-hydraulic testing machines, flow and permeability measurements, X-ray computed tomography imaging, machine learning, fracture mechanics, and micro-mechanical modelling. The project is led by Parisa Shokouhi ([parisa@psu.edu](mailto:parisa@psu.edu)), Jacques Rivière ([riviere@psu.edu](mailto:riviere@psu.edu)), Chris Marone ([marone@psu.edu](mailto:marone@psu.edu)), and Derek Elsworth ([elsworth@psu.edu](mailto:elsworth@psu.edu)). The successful candidate will work with a postdoctoral researcher and other graduate and undergraduate students on illuminating the mechanisms that relate ultrasonic, hydraulic, and frictional properties of fractured rocks (For related recent publications: Shokouhi et al. *Geophysical Research Letters* 2020 <https://doi.org/10.1029/2019GL083557> & Jin et al. *Journal of the Mechanics and Physics of Solids* 2020 <https://doi.org/10.1016/j.jmps.2019.103769>).

We encourage applications from students with interest in mechanics-based modelling, elastic wave propagation, acoustics, geomechanics, geophysics, and machine learning. Programming experience using MATLAB and/or Python is required. Experience in experimental design and execution is preferred. Familiarity with machine learning and deep learning methods is a plus.

If interested, please send your questions/CV to Parisa Shokouhi ([parisa@psu.edu](mailto:parisa@psu.edu)). Dr. Shokouhi will be happy to set up a Zoom meeting with you and discuss the available projects further.

