Multiscale numerical modelling of mechanical behaviors in pile-soil system

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ABSTRACT:

The study of pile-soil systems is of paramount importance in the field of geotechnical engineering, as it is directly related to the stability and reliability of structures and infrastructure. This work investigates the mechanical behavior in pile-soil systems at nanoscale, with emphasis on fiber-reinforced polymer (FRP) piles and rubber-soil mixes (RSM). In this presentation, four parts will be introduced:

- Investigate microscopic friction properties at the FRP pile-clay interface under the effects of normal stresses and shear velocity.
- Investigate the interfacial friction at the FRP pile-sand interface under various dry, pure water, and saltwater conditions.
- Study the interaction at the rubber/soil interface within RSM.
- Develop an efficient integrated pile-soil element to simulate pile behavior while accounting for soil and pile material nonlinearity at the macroscale.