

Hybrid continuum-discrete simulation of soil-object interactions

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ABSTRACT

Many sustainability-driven challenges involve complex interactions between soil and various objects such as structures, penetrometers, and machines. However, computational simulation of these soil-object interactions remains highly challenging, as it requires robust and efficient algorithms for capturing large soil deformation, frictional contact, and complex topology of objects. In this talk, we introduce a hybrid continuum-discrete simulation framework for accurate and efficient simulations of soil-object interactions (Jiang et al., 2022; Zhao et al., 2023; Zhao et al., 2024), whereby the material point method (MPM), finite strain multiplicative elastoplasticity, barrier contact, and the level set method. Results of various numerical examples verify and validate the accuracy and efficacy of the proposed simulation framework.

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