

EME International Seminar Series



Multi-scale modeling of geomaterials with the hierarchical FEMxDEM model

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Abstract:

This talk presents advances in multiscale modeling of geomaterials, with a particular focus on a hierarchical scale coupling between finite element (FEM) and discrete element (DEM) methods. As an alternative approach to classical constitutive modeling, the so-called FEMxDEM model enables a concurrent link between microstructural mechanisms and macroscopic material responses. Special attention is given to the use of homogenization schemes that bridge representative volume elements with a continuum formulation at the larger scale, providing a consistent framework for upscaling constitutive behavior. Selected applications illustrate the potential of these models to capture complex phenomena under non-conventional loading paths, cyclic deformation, inherent material anisotropy, and the influence of advanced microstructural features.

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