GRADUATE STUDENT RESEARCH SEMINAR SERIES (2018)

FROM X-RAY CT IMAGES TO NUMERICAL MODELS: CAPTURING THE GRADING AND SHAPE-DEPENDENT BEHAVIOR OF GRANULAR MATERIALS

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Granular materials, such as soils, biomass, pharmaceutical pills, are quite common and diverse in nature, industries and our daily life. The particulate grains of many granular materials are various-sized and non-spherical in general. The grading and shape characteristics are two of the most salient factors that affect the mechanical behavior of granular materials. The micromechanics-based discrete element method (DEM) is ideally suited to capture those salient features of granular materials from a fundamental level. This talk aims to introduce the state-of-the-art framework of the discrete element modeling the mechanical behavior of granular materials, with the consideration of particle grading and shape effects. In this framework, X-ray computation tomography and imaging analysis are employed to obtain the realistic particle morphology (e.g. the particle size and shape). The obtained particle morphology is then used to generate numerical irregular particles, which are further incorporated into then discrete element model to simulate grading and shape-dependent behavior of the granular material.

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