

Abstract for:

Computational Laboratory for Discrete Element Geomechanics

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Summary:

The discrete element method treats granular materials as a collection of particles rather than as a continuum. This paper presents the design of an integrated suite of three computer programs that implement the discrete element method using two-dimensional ellipse-shaped particles and allow for computer-assisted-drafting (CAD) – style graphic preprocessing and postprocessing. A preprocessing program – Front End Generation (FEGEN) – allows interactive generation of a particulate system for starting the system simulation. Output from a simulation program – Particle Simulation with Ellipses (PARSE) – can be analyzed and graphically interpreted by a postprocessor Front End to Particle Simulation with ellipses (FEPARSE) – to obtain detailed animations, time sequence plots, and contact distributions. As a result, a novice to discrete-element-method modeling can specify a test system, generate the appropriate simulation parameters, run the simulation, and view the results with relative ease. This paper presents the equations used in choosing simulation parameters, computing macroscopic stress and strain tensors, as well as results from an initial validation of the program.