

Abstract for:

**Discrete numerical model for soil mechanics**

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**Summary:**

The Distinct Element Method (DEM), a numerical technique which treats soil as a discrete assemblage of particles, can be useful when local yield, bifurcation behavior or nonlinear soil-structure interaction occurs. A two-dimensional disk-based implementation of the DEM is validated using numerical simulations of standard geotechnical laboratory tests, such as one-dimensional compression, direct simple shear and triaxial tests. These test results indicate that the two-dimensional DEM can simulate realistic nonlinear, stress history-dependent soil behavior appropriately when individual particle rotation is inhibited.

Modeling of large-scale problems is accomplished by constructing a reduced-scale model, then applying the geotechnical centrifuge scaling relationships in order to reduce the number of particles simulated and to ensure stress-strain-strength similitude between the model and prototype. Full-scale simulations, including bearing capacity and lateral earth pressure tests, indicate that the DEM can accurately simulate real geotechnical problems, including those possessing large local yield zones.