

Is the Discrete Element Method Predictive?

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Abstract

In this lecture, new developments on the discrete element method will be presented, highlighting its capability to predict multiscale phenomena in granular materials. The main advance is realized by using level sets to be able to represent arbitrary shapes, which control the bulk of the granular packing behavior. It is shown that the method can predict complex features observed using advanced experimental methods. No continuum models are able to capture such rich phenomena across scales. The second part of this lecture deals with speculating the potential applications and impact that the DEM could have in areas of civil engineering, mechanics, and planetary science, given its current predictive and computational capabilities.