

Abstract Submitted
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Effect of inertial forces on constitutive behaviors of the RVE granular model¹ MIN WANG, DUAN ZHANG, Theoretical Division, Los Alamos National Laboratory — A representative volume element (RVE) granular model has been used in multiscale simulations. For problems of large material deformations particles in RVE are often re-initialized leading to the loss of history information important for many granular materials, especially under a dynamical loading. A new algorithm for using the periodic boundary condition is developed to accommodate the large deformation of the material while maintaining the RVE as a rectangular box. Reinitialization of the RVE is never needed even for extremely large deformations. The algorithm is based on the decomposition of the velocity gradient into an upper-triangular tensor and a spin tensor. The deformation resulting from the upper-triangular tensor is treated by a modified algorithm using the periodic boundary condition. The effect of the spin tensor is accounted for by using a rotating frame of reference. The effects of inertial forces, such as the centrifuge and the Coriolis forces, are considered. In particular, we study the effect of rotation to the stresses and the related objectivity issues when using such obtained stress in multiscale calculations.

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