

## Discrete Element Modeling of the Effect of Particle Shape on Creep Behavior of Rockfills

**Authors :** Yunjia Wang, Zhihong Zhao, Erxiang Song

**Abstract :** Rockfills are widely used in civil engineering, such as dams, railways, and airport foundations in mountain areas. A significant long-term post-construction settlement may affect the serviceability or even the safety of rockfill infrastructures. The creep behavior of rockfills is influenced by a number of factors, such as particle size, strength and shape, water condition and stress level. However, the effect of particle shape on rockfill creep still remains poorly understood, which deserves a careful investigation. Particle-based discrete element method (DEM) was used to simulate the creep behavior of rockfills under different boundary conditions. Both angular and rounded particles were considered in this numerical study, in order to investigate the influence of particle shape. The preliminary results showed that angular particles experience more breakages and larger creep strains under one-dimensional compression than rounded particles. On the contrary, larger creep strains were observed in the rounded specimens in the direct shear test. The mechanism responsible for this difference is that the possibility of the existence of key particle in rounded particles is higher than that in angular particles. The above simulations demonstrate that the influence of particle shape on the creep behavior of rockfills can be simulated by DEM properly. The method of DEM simulation may facilitate our understanding of deformation properties of rockfill materials.

**Keywords :** rockfills, creep behavior, particle crushing, discrete element method, boundary conditions

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