

Modeling the effect of earthquake, excavation and bolt reinforcement with extended DDA of meshless interpolations

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Summary

The traditional Discontinuous Deformation Analysis (DDA) method, like other Discrete Element Methods, is created to model the discrete block system. The extended DDA method based on meshless interpolations means utilizing meshless interpolations, usually the Moving Least-Squares interpolations, to present block displacement field. In the new extensions here, the effects of earthquake, excavation and bolt reinforcement on the assemblages of large blocks are modeled: for modeling earthquake, the initial acceleration value from earthquake at certain DDA time step can be interpolated from the earthquake acceleration vs. time curve; the modeling of excavation is by reversing in-situ stresses at excavation internal boundaries and the stability iteration that follows; for modeling bolt reinforcement, a point-to-point spring with given stiffness is used. Some numerical examples are provided to verify the new functions of extended DDA, including the typical example on tunnel stability analysis.

