3D simulation analysis of sliding failure of rock slope by DEM

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Some excellent analysis methods have been developed in order to estimate the mechanical behavior of rock mass. However, there have been no complete useful methods which can be accurately reproduced these behaviors. Because rock mass contains many fractures such as faults and joints, these mechanism indicates very complicated behavior. Therefore, it is difficult to be making the model of the rock mass including any fractures or rock joints.

As is known, there are many fractures in rock slope, and these fractures are often the cause of failure. Especially, the mechanism of sliding failure depends on fractures in rock slope. In this paper, we attempt to clarify the mechanism of slope failure in modeling of rock slope with discontinuities using three-dimensional distinct element method. However, it is difficult for distinct element method to express the both of continuum and discontinuities. So, we introduce the concept of the bonding force between particles into distinct element method, and it is made to be an applicable analysis method for the continuum.

In distinct element method, the physical property of analysis object is controlled by interparticle parameters. However, the decision procedure of the parameter in this analysis method has not been established. Then, brazilian test were simulated by distinct element method prior to the failure simulation, and the parameter which could express rock mass as an analysis object was considered.

The rock slope model with this analysis can be arbitrarily setting the slope shape and the location of fractures. The position of the fractures in the model is based on the result of the field investigation. And, the fractures were expressed by removing the bonding force. Using this analytical model, it is tried to be simulated an actual sliding failure of rock slope. As the results of this analysis, it is recognized that this simulation can be expressed on this sliding failure phenomena. Moreover, the process of sliding failure can be visualized.