

Study on simulation methods for Design of Rockfall Protection Works

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Currently, the prediction of rockfall motion for the design of rockfall protection works is generally based on empirical methods or two-dimensional mass point analysis methods. These methods do not consider the detailed three-dimensional topography and shape of falling rocks, and there are concerns about the rational and safety aspects of the designed protection works. Therefore, this study attempts to apply a three-dimensional simulation using a Discontinuous Deformation Analysis. While this method can predict detailed rockfall motion considering the shape and physical properties of falling rocks and slopes, the establishment of the input parameters and the shape of falling rocks is an issue. Therefore, in this study, parametric studies on input parameters and rockfall geometry were conducted and their setting methods were investigated. Then, we compared the results with those of a two-dimensional mass point analysis method in a real site, and discussed a simulation technique for designing a rational and safe rockfall protection system. The results of this study show that the three-dimensional simulation using the Discontinuous Deformation Analysis can obtain good analysis results by considering the shape of falling rocks at the site and the characteristics of energy decay during impact. It was also found that the analysis of the actual site can predict the three-dimensional falling rock motion considering the falling rock and slope geometry, and that a rational and safe design of falling rock protection works can be expected compared to the two-dimensional mass point analysis method. The difference between the three dimensional analysis and the anime analysis is that it can analyze from the velocity energy ratio of the falling rock, and can get all the simulation results and finally draw them on the same graph. In addition, considering that falling rocks may have different shapes and masses, three-dimensional analysis can also take into account these factors and perform relevant calculations. As a future problem, the method of setting the energy attenuation in the collision in three-dimensional non mass system analysis

It is necessary to establish an analytical method independent of the skill level of the user. In this study, two comparison of three dimensional mass system analysis and three dimensional non mass system analysis of rockfall movement by maximum value and difference of design method of rockfall protection works was verified. However, in case of actual practice, risk and construction cost based on the probability and scale of falling rock It is necessary to quantitatively obtain the combination of the toes and to evaluate both of them quantitatively.

Keywords: rockfall. Discontinuous Deformation Analysis. two-dimensional. Protection Works