

Numerical Investigation of Embankments for Protecting Rock Fall

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Abstract : Rock fall is a movement of huge rock blocks from dip slopes due to physical effects. It generally occurs where loose tuffs lying under basalt flow or stringcourse is being constituted by limestone layers which stand on clay. By corrosion of some parts, big cracks occur on layers and these cracks continue to grow with the effect of freezing-thawing. In this way, the breaking rocks fall down from these dip slopes. Earthquakes which can induce lots of rock movements is another reason for rock fall events. In Turkey, we have a large number of regions prone to the earthquake as in the World so this increases the possibility of rock fall events. A great number of rock fall events take place in Turkey as in the World every year. The rock fall events occurring in urban areas cause serious damages in houses, roads and workplaces. Sometimes it also hinders transportation and furthermore it maybe kills people. In Turkey, rock fall events happen mostly in Spring and Winter because of freezing- thawing of water in rock cracks frequently. In mountain and inclined areas, rock fall is risky for engineering construction and environment. Some countries can invest significant money for these risky areas. For instance, in Switzerland, approximately 6.7 million dollars is spent annually for a distance of 4 km, to the systems to prevent rock fall events. In Turkey, we have lots of urban areas and engineering structure that have the rock fall risk. The embankments are preferable for rock fall events because of its low maintenance and repair costs. Also, embankments are able to absorb much more energy according to other protection systems. The current design method of embankments is only depended on field tests results so there are inadequate studies about this design method. In this paper, the field test modeled in three dimensions and analysis are carried out with the help of ANSYS programme. By the help of field test from literature the numerical model validated. After the validity of numerical models additional parametric studies performed. Changes in deformation of embankments are investigated by the changes in, geometry, velocity and impact height of falling rocks.

Keywords : ANSYS, embankment, impact height, numerical analysis, rock fall

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