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The distinct element analysis of toppling failure mechanisms

Şaziye Özge Dinç (1), Nihat Sinan Işık (2), and Zeki Karaca (3)

(1) Çanakkale Onsekiz Mart University, Engineering Faculty, Geolgical Engineering, Çanakkale, Turkey (osgedc@gmail.com), (2) Gazi University, Technology Faculty, Civil Engineering Department, Ankara, Turkey , (3) Çanakkale Onsekiz Mart University, Engineering Faculty, Mining Engineering Department, Çanakkale, Turkey

This project investigates the toppling failure mechanisms of rock masses having different rock materials and discontinuity properties in slopes that are designed in different heights. For this purpose, PFC2D as a distinct element code was used to anticipate the post failure behaviors of rock masses. After the simulation of laboratory tests on the samples in 2 (width) *4 (height) m, macro mechanical properties of rock masses were determined to be assigned the slopes. The properties of discontinuities were set up based on the smooth-joint method in PFC. The movements in the slopes -equipped with persistent and non-persistent discontinuities- were analyzed by using gravity increase method. The results show that the post failure behaviors of all rock samples have been controlled primarily by joint location and joint length. In addition to this, an increase on the slope height has an influence on the failure mechanism such that triggers the materials to transit from the toppling to circular yielding manner in some models. It has been also worth note that all models begin to fail as soon as the wing cracks develop by tension stresses, thus the tensile strength of the relevant rock material is the most critical mechanic parameter on the failure.