Geophysical Research Abstracts,
Vol. 11, EGU2009-12299, 2009
EGU General Assembly 2009

Modelling Progressive Failure in Rock-slopes

M. Güell i Pons and M. Jaboyedoff
Institute of Geomatics and Risk Analysis, University of Lausanne, Switzerland (maria.guellpons@unil.ch)

Rock failures are common in Alpine mountain chains and pose a threat to life and infrastructures. In general, rock slope stability is an interplay between existing discontinuities and development of new ones in intact material. In this work, we study progressive failure by means of numerical methods at multiple scales and using distinct element methods (DEM). Distinct element methods are of advantage because they account for discontinuities and are able to simulate the development of failure in time. The use of micro-parameters instead of constitutive laws allows studying the influence of heterogeneities present in the rock mass.

In the first case, the code PFC-2D is used at the slope scale to test the influence of the slope geometry, the joint sets distribution and the joint set persistence in the case of toppling failures under various triggering mechanisms. Heterogeneity properties (cohesion and friction angle) are distributed randomly to simulate natural rock variability. In the second case, a cellular automata model, which is based on concepts of progressive failure in disordered systems, is used to explain the role of heterogeneities in the fracture process at a small scale. The results provide a link to time-to-failure predictions observed in some field cases.

This study aims to be a base for the development of a model which permits to understand why some rock masses accelerate until global failure while other are capable to stabilize under the same conditions.