Geophysical Research Abstracts,
Vol. 11, EGU2009-12025-1, 2009
EGU General Assembly 2009

A comparison between numerical approaches for rockfall analysis

D. Salciarini, P. Conversini, and C. Tamagnini
University of Perugia, Department of Civil and Environmental Engineering, Perugia, Italy (diana@unipg.it)

An important issue in the evaluation of potential hazard related to rockfalls is the quantitative prediction of the traveling distance of the falling blocks, which is necessary to identify the potentially endangered area. This information is also fundamental for the design of appropriate defensive works, which are intended to reduce the potential impact of the landslide on the population and facilities potentially at risk. Recently, several numerical techniques have been developed and applied to this purpose, based on the solution of the Newton's equations of motion for each block. The aim of this work is to compare the performance of three such approaches, namely the Lumped Mass Method (LMM), the Colorado Rockfall Simulation Program (CRSP), and the Discrete Element Method (DEM). These approaches have been used to simulate a real case study occurred in a rock slope located in central Italy where several rockfall events occurred and were monitored (recorded) by in-situ surveys from the local administration. The results of the study indicate that when an appropriate calibration of the physical parameters is carried out the different approaches can correctly reproduce the observed phenomenon. As compared to the other methods, the DEM approach has the additional capability of modeling block fragmentation induced by impacts with the slope surface. The results of the DEM simulations show that the kinematics of the blocks can be strongly affected by fragmentation and the traveling distance tends to decrease progressively with block fragmentation.