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MIBSA: Multi Interacting Blocks for Slope Analysis

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As it is well known, the slope instabilities have very important consequences in terms of human lives and activities. So predicting the evolution in time and space of slope mass movements becomes fundamental. This is even more relevant when we consider that the triggering mechanisms are a rising ground water level and the occurrence of earthquakes. Therefore, seasonal rainfall has a direct influence on the triggering of large rock and earthslide with a composite failure surface and causing differential behaviors within the sliding mass.
In this contribution, a model describing the slope mass by means of an array of blocks that move on a prefixed failure surface, is defined. A shear band located at the base of each block, whose behavior is modelled via a viscous plastic model based on the Perzyna's approach, controls the slip velocity of the block. The motion of the blocks is obtained by solving the second balance equation in which the normal and tangential interaction forces are obtained by a specific interaction model.
The model has been implemented in an original code and it is used to perform a parametric analysis that describes the effects of block interactions under a transient ground water oscillation. The numerical results confirm that the normal and tangential interactions between blocks can inhibit or induce the slope movements. The model is tested against some real case studies.
This model is under development to add the dynamic effects generated by earthquake shaking.