Geophysical Research Abstracts
Vol. 17, EGU2015-13367, 2015
EGU General Assembly 2015

Numerical modelling of hydrologically-driven slope instability by means of porous media mechanics

Evanthia Kakogiannou, Lorenzo Sanavia, Marco Lora, and Bernhard Schrefler
Department of Civil, Architectural and Environmental Engineering - University of Padua, Via F. Marzolo 9, 35131 Padua, Italy

Heavy rainfall can trigger slope failure which generally involves shallow soil deposit of different grading and origin usually in a state of partial saturation. In this case of slope instability, the behaviour of the soil slope is closely related not only to the distribution of pore-water pressure but also to the stress state during rainfall infiltration involving both mechanical and hydrological processes. In order to understand better these physical key processes, in this research work, the modelling of rainfall induced slope failure is considered as a coupled variably saturated hydro-mechanical problem. Therefore, the geometrically linear finite element code Comes-Geo for non-isothermal elasto-plastic multiphase solid porous materials is used, as developed by B.A. Schrefler and his co-workers.

In this context, a detailed numerical analysis of an experimental slope stability test due to rainfall infiltration is presented. The main goals of this work are to understand the triggering mechanisms during the progressive failure, the effect of using different constitutive models of the mechanical soil behavior on the numerical results and the use of the second order work criterion on the detection of slope instability.