ADVANCED NUMERICAL METHODS FOR SLOPE INSTABILITY AND LANDSLIDE ANALYSIS

1600 (GEOMECHANICS AND NATURAL MATERIALS)

WEIYA XU[*], JIANFU SHAO[†%]

[*] HOHAI University
Xikan Road 1, 210098 Nanjing, Jiangsu province, China
wyxu@hhu.edu.cn

[†] University of Lille, CNRS, LaMcube, FR2016
Cite scientifique, ESPRIT Building, 59655 Villeneuve d'Ascq, France
jian-fu.shao@polytech-lille.fr
% Corresponding organizer

Key words: slope instability, landslide, hydro-mechanical coupling, continuum methods, discrete methods, artificial intelligence based methods.

ABSTRACT

Slope instability and landslides are one of the major natural catastrophes that cause important losses for economic development and human life. In spite of significant advances during the last decades, many issues are still open and require further investigations on understanding of physical mechanisms, on development of robust advanced numerical methods for prediction and prevention as well as modern controls techniques. In particular, landslides induced by heavy raining and reservoir water-level change become more and more frequent and many related features need to be studied in depth.

This mini-symposium essentially focused at advanced numerical methods for the prevention and prediction of slope instability and landslides, by considering hydromechanical coupling and hydro-dynamical effect. The key issues related to slope instability and landslides are the determination of instability onset conditions and the calculation in the post-instability regime. The main challenge is to consider strong displacement discontinuities inside instability or slipping zones, and their consequences on both mechanical and hydraulic fields.

The objective of the mini-symposium is make a state-of-the-art on different kinds of numerical methods developed during the last decades, to compare their advantages and shortcomings, to discuss together on future improvements and to set up possible collaborations. Both theoretical and numerical issues will be considered:

- Instability conditions and numerical implementation
- Continuum mechanics based methods
- Discontinuous methods, discrete element methods, peridynamics methods
- Combined and coupled methods
- Artificial intelligence-based methods
- Specific models for unsaturated media, erosion, hydrodynamic effect