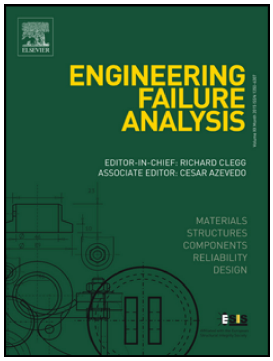

The failure processes analysis of rock slope using numerical modelling techniques

S.B. Tang, R.Q. Huang, C.A. Tang, Z.Z. Liang, M.J. Heap

PII: S1350-6307(16)31113-X
DOI: doi: 10.1016/j.engfailanal.2017.06.029
Reference: EFA 3194

To appear in: *Engineering Failure Analysis*

Received date: 16 November 2016
Revised date: 2 June 2017
Accepted date: 14 June 2017

Please cite this article as: S.B. Tang, R.Q. Huang, C.A. Tang, Z.Z. Liang, M.J. Heap , The failure processes analysis of rock slope using numerical modelling techniques, *Engineering Failure Analysis* (2017), doi: 10.1016/j.engfailanal.2017.06.029

The failure processes analysis of rock slope using numerical modelling techniques

S.B. Tang[1, 2*], R.Q. Huang[2], C.A. Tang[1], Z.Z. Liang[1], M.J. Heap[3],

[1] State Key Laboratory of Coastal and Offshore Engineering, Dalian University of Technology, Dalian, 116024, China

[2] State Key Laboratory of Geohazard Prevention and Geoenvironment Protection, Chengdu University of Technology, Chengdu 610059, China

[3] Géophysique Expérimentale, Institut de Physique de Globe de Strasbourg (UMR 7516 CNRS, Université de Strasbourg/EOST), 5 rue René Descartes, 67084 Strasbourg cedex, France

Abstract: The slope failure process includes crack initiation, propagation and coalescence during the formation of a slip surface (small deformation stage) and block movement, rotation and fragmentation during the sliding process (large deformation stage). Neither the finite element method (FEM) nor the discontinuous deformation analysis method (DDA) can solve such problems satisfactorily due to the complex mechanical behaviour of slope failure. To study the entire process of slope failure, we develop here a model that combines the FEM and DDA approaches. The main concept of this approach is to first apply FEM to model crack growth behaviour and then automatically switch to the DDA module to model the post-failure process when the slip surface forms. The efficiency and simplicity of this approach lies in keeping the FEM and DDA algorithms separate and solving each equation individually. The heterogeneous nature of the slope material at the mesoscopic level is considered by assuming that the mechanical properties of individual elements follow a Weibull statistical distribution.

* Corresponding author Tel: +86 411 84708694; Fax: +86 411 87315655; Email address: Tang_Shibin@dlut.edu.cn