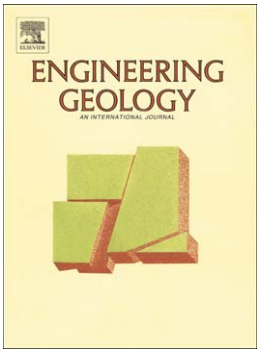


# A new semi-deterministic block theory method with digital photogrammetry for stability analysis of a high rock slope in China

Tiexin Liu, Jianhui Deng, Jun Zheng, Lu Zheng, Zhenghu Zhang, Hongchun Zheng

PII: S0013-7952(16)30658-5
DOI: doi:10.1016/j.enggeo.2016.11.012
Reference: ENGEO 4417

To appear in: *Engineering Geology*

Received date: 1 June 2016
Revised date: 13 November 2016
Accepted date: 16 November 2016

Please cite this article as: Liu, Tiexin, Deng, Jianhui, Zheng, Jun, Zheng, Lu, Zhang, Zhenghu, Zheng, Hongchun, A new semi-deterministic block theory method with digital photogrammetry for stability analysis of a high rock slope in China, *Engineering Geology* (2016), doi:10.1016/j.enggeo.2016.11.012

**Title:** A new semi-deterministic block theory method with digital photogrammetry for stability analysis of a high rock slope in China

**Author Names:**

Tiexin Liu [a], Jianhui Deng [a], Jun Zheng [b, c, *], Lu Zheng [d], Zhenghu Zhang [d], Hongchun Zheng [e]

[a] State Key Laboratory of Hydraulics and Mountain River Engineering, College of Water Resource & Hydropower, Sichuan University, Chengdu 610065, China

[b] Department of Civil Engineering, Zhejiang University, Hangzhou 310058, China

[c] Rock Mechanics in Hydraulic Structural Engineering，Ministry of Education, Wuhan University, Wuhan 430072, China

[d] Institute for Disaster Management and Reconstruction，Sichuan University, Chengdu 610065, China

[e] China Three Gorges Corporation， Chengdu 610023, China

*Corresponding Author: Tel.: +86 57188208732 fax: +86 57188208732. E-mail address: zhengjun12@zju.edu.cn

**Abstract:** This study proposed a new semi-deterministic block theory (NSDBT) method, in which the sizes and spatial positions of discontinuities along with their orientations were incorporated. Hence, the locations, volumes, and sliding forces of key rock blocks could be obtained, which could directly provide quantitative reference for support design. The NSDBT method was applied to analyze the stability of a high rock slope of Changhe dam located in Sichuan province, southwest China. Required geological data for the analyses was obtained from field and laboratory investigations. The mechanical parameters of discontinuities were obtained by laboratory direct shear tests, and geometric characteristics of discontinuities were obtained by digital photogrammetry. A total of 3540 discontinuities were identified. The analysis results showed that: (a) 57.7% key blocks were excluded owing to taking the formation probability of key blocks into consideration; (b) comparing the results of the calculation and field investigation, it was found that the calculated locations of dangerous discontinuities were in good agreement with the failed blocks investigated in the field (note: the failed blocks include blocks that have developed into real