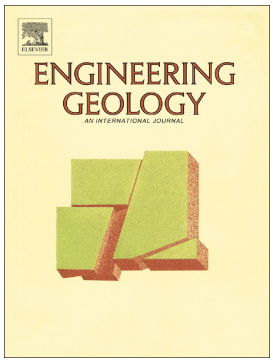

Effects of directionality and vertical component of ground motions on seismic slope displacements in Newmark sliding-block analysis

Wenqi Du

PII: S0013-7952(17)31591-0
DOI: doi:10.1016/j.enggeo.2018.03.012
Reference: ENGEO 4790

To appear in: *Engineering Geology*

Received date: 5 November 2017
Revised date: 14 March 2018
Accepted date: 16 March 2018

Please cite this article as: Wenqi Du , Effects of directionality and vertical component of ground motions on seismic slope displacements in Newmark sliding-block analysis. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Engeo(2018), doi:10.1016/j.enggeo.2018.03.012

Effects of Directionality and Vertical Component of Ground Motions on Seismic Slope Displacements in Newmark Sliding-block Analysis

Wenqi Du* wqdu@ntu.edu.sg

Institute of Catastrophe Risk Management, Nanyang Technological University, 50 Nanyang Avenue, Singapore, 639798.

*Corresponding author.

ABSTRACT

The Newmark sliding block model is widely used in the evaluation of seismic slope stability. When using this model, the horizontal acceleration is usually considered to act parallel to the slope (downslope), and the vertical component of ground motions is commonly ignored. This study investigates the effect of vertical accelerations on the results of sliding displacement, and quantitatively compares the difference of the displacement D_N calculated from the original Newmark's approach with the displacement D_{HV} calculated from a more realistic case (horizontal and vertical accelerations properly considered). For this purpose, 4,136 ground motion recordings are selected from the NGA-West2 database, and more than 2,000 hypothetic slopes are simulated with critical accelerations a_c ranging from 0 to 0.8 g. Comparison of D_{HV} and D_H shows that the incorporation of vertical accelerations only slightly increases the displacement. Besides, the calculated D_{HV}/D_N ratios are generally in the range of 1 to 5, indicating that D_N significantly underestimates the slope displacement due to the simplification of seismic excitations. The D_{HV}/D_N