



Risk estimation of the earthquake induced Chiufengershan landslide in Taiwan

K. Shou, H. Chang, C. Wang and Y. Chen

Department of Civil Engineering, National Chung-Hsing University, Taichung, Taiwan
(kjshou@dragon.nchu.edu.tw / Phone: +886 4-22850989)

On September 21, 1999, a catastrophic earthquake with magnitude of 7.3 (M_L) occurred in central Taiwan, with epicenter near a small town called Chi-Chi. The Chiufengershan landslide is one of the major landslides; it not only caused 39 casualties, but also formed two landslide dammed lakes. Unlike the other major landslides due to the Chi-Chi earthquake, the Chiufengershan area actually does not have any written record of landslide (induced neither by heavy rain nor by earthquake) for the past 100 years, even though topographically it can be clearly identified as a dip slope.

In view of the characteristics of the landslide area, it is of great interest to understand to the failure mechanism and the risk of the residual slopes, which motivates this study. In this study, topography and geology investigations are followed by a series of laboratory tests, including slaking durability test, direct shear test, and triaxial test, etc. The failure mechanism of this landslide was first studied by limit equilibrium back analyses.

Considering the interdependency and the time effects, the uncertainty of the input parameters for the stability analysis is discussed. Then, through the Monte Carlo analysis and time series analysis, the risk of the residual slope was estimated. A series of stability analyses were employed to study the prequake and postquake behavior of the slope. The results show that the dynamic impact of Chi-Chi earthquake is more than enough to trigger the rock sliding, and dynamic loading will still control the stability of the residual slope.