Analysis of landslide trigging mechanism by means of numerical simulation, morphological reconstruction and evolution

Kuo-Jen Chang

Department of Civil Engineering, National Taipei University of Technology

The key information of landslide, including range of landslide, volume estimation and the subsequent evolution are important when analyzing the triggering mechanism, hazard assessment and mitigation. The Jiufengershan rock-and-soil avalanche was triggered by the 1999 Chi-Chi Taiwan earthquake, mobilizing a 60 m thick and 1.5 km long sedimentary pile dipping ~22˚SE toward a transverse valley. The initiation and propagation of the avalanche were simulated using a discrete element method. For a paleo-landslide, however, the morphological features of landslide could often be concealed by the successive surface processes after slid. To alleviate this difficulty, this research proposes a topological reconstruction method to enable the assessment of key information based on the DEM yielded from high-resolution LiDAR images. Two large-scale landslides in volcanic terrain were studied by means of current DEM obtained from LiDAR, as well as the reconstructed paleo landform before landslide and just after landslide. The small scale disturbance after landslide were accordingly estimated, based on the nature that the incision of gully would lead to sharp mass-wasting relief and the gully should be filled to resume the original topology as

well. Furthermore, the paleo-morphology of the slid area before major landslides was reconstructed based on the originally undisturbed dome-shaped topography of volcano, which is inferred by the nearby un-eroded geometry of the same volcano.