A discussion on the characteristics of seismic signals of different landslide movement types by coupling PFC and FLAC codes

*Rui-Jia Zhuang[1], Zheng-yi Feng[1]

1. National Chung Hsing University Department of Soil and Water Conservation

This study discussed the characteristics of seismic signals for different types of landslide movement, including rock fall, translational slide and flow. In this study, PFC (Particle Flow Code) and FLAC (Fast Lagrangian Analysis of Continua) codes were coupled to simulate the seismic signals generated by the three types of landslide movement. The landslide mass was simulated by PFC particles, and the seismic signals were recorded by FLAC. The analyses of the seismic signals includes the empirical mode decomposition (EMD) to obtain IMFs (Intrinsic Mode Functions), and to obtain the energy ratio and vibrational frequencies of the IMFs and Hilbert-Huang Transform (HHT) to obtain a time-frequency spectrum. The parameters, Arias intensity, significant duration and vibrational frequency in the signals of the three movement types were also calculated. For further discussion, this study simulated the seismic signals generated by flow and translational slide in different volume of moving masses, in order to find the relationship between the volume and Arias intensity. Furthermore, in order to evaluate the correctness of the coupling simulation method of PFC and FLAC, the authors constructed a model slope at Huisun Forest Farm in Nantou County, Taiwan to conduct a field test. The seismic signals generated by falling of rocks and rock-debris mixture were monitored. The process of this field test was also simulated by coupling PFC and FLAC codes. The parameters, including Arias intensity, significant duration and vibrational frequency were compared and evaluated.

Keywords: Seismic signals, Landslide, Numerical modeling, PFC, FLAC