山區淺層崩塌預警模式之研發

Development of shallow landslide warning system in mountainous area

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摘　要

臺灣地區地形陡峭、降雨強度集中，往往造成崩塌與土石流，進而造成人員傷亡與鉅額財產損失。隨著數值高程資料精度的增加，使得工程師能依照集水區的地文與水文特性，進而建置物理型淺層崩塌分析模式，藉此預測坡地災害可能發生的時間。研究中蒐集蘇花公路蘇澳至東澳路段之易致災集水區水文及地文資料進行分析，並採用水文模式配合 2010 年至 2013 年雨量資料，以模擬各集水區飽和水位之變化；而後將所得集水區飽和水位之變化配合無限邊坡穩定分析，藉以預測集水區之安全係數。研究結果顯示，本研究所得之分析結果與災害實際發生時間相符。因此應用本研究之分析方法，應可藉以發佈即時淺層地滑災害之警訊，以減少傷亡與損失。

關鍵詞：淺層崩塌，水文模式，安全係數

Abstract

Landslides and debris flow usually occur in Taiwan to result in casualties and property losses due to steep topography and concentrated rainfall intensity. By using high resolution digital elevation data, current engineers are able to develop the physical model for shallow landslide prediction based on watershed geomorphologic and hydrologic characteristics. In this study, hydrologic records and geological information from high risk watersheds on the Su-Hua Highway (from Su-Ao to Dong-Ao section) were collected for analysis. By using hourly rainfall data from 2010 to 2013, variation of the saturated water table on hillslopes was simulated using a hydrological model, and the temporal saturated water level was then used in the slope instability analysis to predict factor of safety in the investigated areas. The results indicated that the studied watersheds were considered having potentiality for landslide occurrence. The predicted landslide occurrence time was found coincidence with the field investigation data. It is therefore considered promising to apply the proposed analytical procedure for real-time shallow landslide warning to alleviate the loss of lives and property.

Keywords: shallow landslide, hydrological model, factor of safety