地震誘發坡地崩塌之數值模擬及穩定性評估

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摘　　要　本研究採用二維有限元素法動態應力穩定分析法，來建立一套邊坡受地震力作用時之穩定性評估模式。首先，採用小型振動台模型實驗之實驗成果進行數值模擬並檢核數值程序之可靠性及有效性。隨之，依據中央氣象局 921 地震記錄資料選用三種地震加速度歷時曲線，其編號分別為 *E5*、*E6* 及 *E7* 來進行虛擬邊坡之受震分析。在分析中，此三種歷時曲線分別用來代表地震強度 *I*=5 級、6 級及 7 級之相當地震力輸入資料。另外，在三種地震力作用模式下，針對地層材料、邊坡坡度、邊坡高度等各種穩定性影響因子進行參數研究後，再依據量化分析成果，即受震邊坡之臨界加速度及累積位移量，來評估各影響因子對地震誘發邊坡破壞潛勢之影響度。

關鍵詞：有限元素法、動態應力穩定分析法、臨界加速度、累積位移量。

Numerical Evaluations on Stability of Slopes Subjected to Earthquake Loading

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ABSTRACT　　Using two dimensional finite element method of dynamic stress stability analysis, this study establishes a stability evaluation model of hill slope during earthquakes. First, the experimental results of a small scale shaking table test were used to calibrate the reliability and effectiveness of the proposed numerical model and calculation procedures. Subsequently, three modes of earthquake acceleration time history curves entitled *E5*、*E6* and *E7* were selected from the data bank of the 921 earthquake in Central Weather Bureau and used as earthquake loading inputs for the dynamic stability analysis of man-made fictitious slopes. The *E5*、*E6* and *E7* are real time acceleration time history curves and can be used to represent the earthquake intensities *I* values equivalent to levels 5, 6 and 7 in Taiwan respectively. Through the input of three earthquake loading modes *E5*、*E6* and *E7*, the parametric study of various influence factors on the slope stability such as stratum material, slope inclination and slope height can be carried out. At last, based on the calculated critical acceleration and accumulative displacement under earthquake loadings, the weighting of various influence factors on the failure potential of hill slope can be evaluated quantitatively.

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