

降雨誘發坡地土砂災害之危險度評估模式

林德貴 林永欣 吳正義 游繁結*

摘要 本研究依據現有之數值工具、分析技術及案例驗證建置一套可行之坡地土砂災害(或坡地型土石流)數值模擬程序以評估此類型土砂災害之危險度。該數值模擬程序包含:坡地之降雨-滲流-安全係數數值模式(R-S-F模式)及土砂之降雨-流動-堆積數值模式(即R-F-D模式)。其中R-S-F模式用以計算不同地形、地質及降雨量條件下之坡面崩塌規模,而此崩塌規模再轉換為R-F-D模式所需之輸入土砂量體,來進行土砂流動影響範圍計算,並據以評估降雨所引發土砂災害之可能危險度。本研究亦整合上述兩個模式參數研究之計算成果,用以製作簡化型應用圖表,透過簡單現場調查及簡化型應用圖表查用,吾人即可針對土砂災害潛勢區進行土砂災害危險度安全係數計算及危險度評估,並可作為颱風降雨期間警戒及疏散預測之參考。

關鍵詞: 坡地土砂災害、坡地型土石流、數值模式、R-S-F模式、R-F-D模式、危險度安全係數。

An Evaluation Model of Hazard Potential for Rainfall Induced Sediment-Related Slope Disaster

Der-Guey Lin Yung-Hsin Lin Cheng-Yi Wu Fan-Chieh Yu*

ABSTRACT To make an immediate evaluation for the hazard potential of sediment-related slope disaster (or slope-type debris flow) caused by torrential rainfalls, this study aimed to establish a feasible procedure including the currently available numerical tools and analytical techniques using historical cases. In which, the numerical models included: (1) Rainfall-Seepage-Factor Safety Model or R-S-F Model and (2) Rainfall-Flow-Deposition Model or R-F-D Model. The R-S-F Model is used to calculate the collapse scale of a failure slope characterized by different slope angles, slope lengths, colluvium thicknesses, geological materials, and rainfall intensities. Subsequently, the collapse scale from the R-S-F Model was further converted into the quantity of sediment required for the R-F-D Model to simulate the influence zone of the flowing sediment. Finally, integrating the calculated results of parametric study using the R-S-F Model and R-F-D Model, a series of simplified application charts could be generated. Accompanying simple field investigations, the application charts can be implemented at the potential area to evaluate the hazard potential of sediment-related slope disaster. They can be used as a reference for disaster prevention, warning systems, and evacuation aspects during torrential rainfall in typhoon season.

Key Words : Sediment-related disaster of slope, slope-type debris flow, numerical model, R-S-F model, R-F-D model, factor safety of hazard potential.