

降雨期間土砂災害危險潛勢數值分析及評估模式

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摘 要

台灣因陡峭地形、破碎地質及季節性颱風豪雨等環境條件下，由降雨所引發之坡地土砂災害(以下簡稱土砂災害)發生頻繁。本文依據現有之數值工具、分析技術及案例驗證來建置一套可行之土砂災害數值模擬程序，其中包含串聯式降雨-滲流水壓-土體位移率-穩定性安全係數數值模式(Rainfall-Pore Pressure-Displacement Rate-Factor Safety Numerical Model, 簡稱R-u-v-F模式)及降雨土砂流動數值模式(Rainfall-Sediment-Flow Numerical Model, 簡稱R-S-F模式)，以便迅速評估豪雨所引發土砂災害之可能影響。同時，整合「R-u-v-F模式」與「R-S-F模式」之計算成果，並進行簡化型應用圖表製作。透過簡單之現場調查及簡化型應用圖表之查用後，吾人即可針對土砂災害潛勢區進行土砂災害危險潛勢之評估，並作為颱風降雨期間警戒及疏散預測之參考。

關鍵字：降雨、坡地崩塌、土砂災害、危險潛勢、數值模式。

Numerical Analyses and Evaluation Models of Hazard Potential of Sediment-Related Disaster During Rainfall

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Abstract

Due to the meteorological characteristics, seasonal typhoon, steep topography and fragile geological conditions, the torrential rainfall induced slope failure and sediment-related disaster frequently occur in Taiwan. Using the existing numerical tools, analysis techniques and case history verification, this study established a feasible numerical procedure which consisted of Rainfall-Pore Pressure-Displacement Rate-Factor Safety Numerical Model (or called *R-u-v-F* Model) and Rainfall-Sediment-Flow Numerical Model (or called *R-S-F* Model) to perform a immediate evaluation for the possible influence of sediment-related disaster caused by torrential rainfall. Eventually, integrating the calculation results of *R-u-v-F* Model and *R-S-F* Model, a series of simplified application charts were generated. Accompanying with simple field investigations, the simplified application charts can be implemented at the sediment-related disaster potential area to evaluate the hazard potential and used as a reference of disaster prevention, warning system and evacuation during torrential rainfall in typhoon season.

Key Words : Rainfall, slope failure, sediment-related disaster, hazard potential, numerical model.

一、前 言

台灣由於地形陡峭，地質脆弱及豪雨集中等原因，致使坡地土砂災害發生頻繁。尤其在921地震之後，每逢豪雨坡地崩塌、地滑及土石流災

情不斷，是以政府及學術單位競相投入大量人力物力研究土砂災害相關議題。其中，主要者包含：(1)土砂災害之肇因分析與防治對策研擬 (2)崩塌影響範圍預測及保全對象之調查(3)災害潛勢評估與預警(4)土地利用管理等。在上述研究課