

土石流流動模擬技術於災害風險區劃定及 災損評估應用之研究

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摘 要 本研究採用二維有限差分法數值分析程式，針對花蓮地區之土石流潛勢溪流，進行災害風險區劃定及災損評估。首先，藉由參數敏感度分析，來探討各數值運算參數及材料特性參數之輸入值，對數值計算結果之影響。隨之，經由特定土石流事件之土石災害影響範圍之計算值與其觀測值之比對，即可決定一組適用於現地土石流流動模擬之參數組合並建立一套標準化之土石流流動數值模擬程序。採用上述數值模擬程序，可針對花蓮地區之土石流潛勢溪流，在不同災害規模設定條件下，模擬土石流流動之可能影響範圍及其流動深度分布。依據影響範圍及其流動深度之計算結果，即可進行土石流潛勢溪流影響範圍之劃定及災害風險之等級評估。透過定義土石流影響範圍內之災損元素，及二維有限差分法數值分析程式之災損計算模組之演算，即可獲得土石流影響範圍內之災損價值。本研究之分析成果，除了可提供土石流防災單位，在執行土石流相關政策及資源運用時之參考依據外，對於土石流潛勢溪流之災損評估方面亦提出一個較科學的量化計算方法，以供後續防災、救災與減災作業之參考。

關鍵詞：土石流潛勢溪流、影響範圍之劃定、災害風險、災損評估。

Applications of Simulation Technique on Hazard Zone Delineation and Damage Assessment of Debris Flow

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ABSTRACT This study performed a series of hazard zone delineations in creeks with potential of debris flow and damage assessment in the Hua-Lien district using a two-dimensional (2-D) finite difference numerical tool. The input values of various numerical parameters and their influence on numerical calculation were investigated by sensitivity analyses. Subsequently, a set of parameters which are appropriate for the simulation of debris flow motion can be determined by comparing computed influences zone with those from observations. Using the aforementioned

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numerical simulation procedures, the influence zone and the distribution of flow depth of debris flow motion in creeks with potential of debris flow can be simulated under various debris flow intensities. According to the calculation results of influence zones and the flow depth of debris flow, the delineation of influence zones and hazard assessment can be achieved. Through the definition of damage elements within influence zone and the flood damage estimation module in the 2-D finite difference numerical tool, the damage value within the influence zone of debris flows can be calculated. In addition to providing public agents or the private sector with the necessary information for executing relevant policies and resource allocation toward debris flow prevention, this study proposes a scientific and quantitative method which enables a systematic analyses of damage assessment in potential debris flow torrents.

Key Words: creeks with potential of debris flow, delineation of influence zones, disaster risk, damage assessment.