

應用 SRH-2D 數值模型模擬臨河崩坍地之河道 土砂運移

Simulation of River Sediment Transport in Riverbank Landslide Areas Using the SRH-2D Numerical Model

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摘 要

在自然災害如泥石流、山體滑坡等異常、極端情況下，近年來，台灣中部的一些地方發生了大範圍的持續暴雨，洪水和颱風接連不斷，使得邊坡不穩定和泥石流位移，導致了一系列山體滑坡和泥石流事件，造成了人員和財產的嚴重損失。非地震引發的山體滑坡發生在坡地，當有地下水並且在不透水層（岩石或粘土）上形成高密度水層時，特別是在大雨時。地表滑動層上的土壤質量也因水在土壤顆粒之間的孔隙中增加而增加，滑動面的傾斜方向使得大量濕重的土壤容易在光滑的基底上滑動。當這些條件聚集時，滑坡從緩慢移動開始，隨後裂縫發展，土壤的保持力減弱。這種移動逐漸加速，當大量土壤移動並帶走一切時，滑坡就開始了。初始滑坡將摧毀房屋，將人埋在坡下。當土石流進入一條集水的溪流時，就會引發土石流。因此，有必要深入研究河岸侵蝕機制，以便未來可持續利用河岸防護工程。本文提出了基於 SRH-2D 水力砂石運輸模型的解決方案，用於監測和預警邊坡不穩定及測量泥沙和泥石流的位移。模擬泥沙運輸和滑坡是一種有效的方法來檢測邊坡和泥石流的移動。因此，建議合作部署一個簡單有效的邊坡監測系統，以預警即將發生的山崩和泥石流，這項系統可以廣泛應用於台灣中部的山區。

關鍵詞：SRH-2D、二維數值模式、岩石或粘土

Abstract

Given the abnormal and extreme nature of natural disasters such as flash floods and landslides, in recent years, continuous heavy rains over large areas and successive storms have occurred in some regions of central Taiwan. These events have destabilized slopes and caused debris flow displacement, resulting in landslides and mudslides with severe damage to people and property. Non-seismic landslides occur on slopes when there is groundwater,

forming a high-density water layer on an impermeable layer (rock or clay) during heavy rains. The volume of soil on the sliding surface also increases due to water in the pores between soil particles, and with the inclination of the sliding surface, a large mass of wet soil can easily slide on a smooth base. When these conditions converge, landslides begin with slow movement, followed by cracks and weakening of the soil's holding force. This movement gradually accelerates, and a landslide begins when a mass of soil moves, sweeping away everything in its path. Initial landslides will destroy houses and bury people under slopes. When a landslide enters a stream concentrating water flow, it causes mudslides. Therefore, in-depth research on riverbank erosion mechanisms is necessary to facilitate the sustainable use of riverbank protection structures. This article addresses solutions for monitoring and early warning of slope instability and measuring soil displacement and mudslide transport based on the application of the SRH-2D hydraulic sediment transport model. Simulating sediment transport and landslides is an effective approach to detecting slope and mudslide movements. From this, it is proposed to cooperatively deploy a simple and effective slope monitoring system to warn of impending landslides and mudslides, which can be widely implemented in the mountainous areas of central Taiwan °

Keywords: SRH-2D 、 2D numerical model 、 Rock or Clay