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歷年試驗及經驗應用於梳子壩之設計

Experiments and Field Experiences Applied to Practical

Use in Slit Dam Design.

National Chung Hsing University

指導教授：段錦浩 教授

Adviser: Prof. Ching-Hao Tuan

余志鵬 副教授

Assoc. Prof. Chih-Peng Yu

研究生：金士豪 撰

Shih-Hao Jin

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## 摘要

因山坡地的開發，近年來台灣土石流災害經常發生。有鑑於此，國立中興大學水土保持學系坡地工程研究室於民國 92 年起，致力於模擬並分析土石流來襲時，加設緩衝設施(廢輪胎)之防災構造物(梳子壩)對巨礫撞擊力削減之效果；試驗經過了不斷的修改與調整，至民國 97 年止皆得到正面的成果。

本文先以工程案例分析切入，評估其成效及設計上之缺失，也將常見的問題提出且建議改善的辦法。再以歷年的實驗數據為基礎，使用統計分析方法證明其效果。接著以不同觀點去歸納分析各項數值所代表之意義，再分別以撞擊力、衝量、能量的概念去談整體機制。最後再用不同的撞擊點位對照歷年實驗配置來說明其皆得到好的效果。文末將所提到的重點加以整理，將之實際應用至現場施工設計。

於文章提出梳子壩設計要點，逐項列出設計步驟，提供給設計者做為相關設計之參考指標，也期望能在將來可以為後人廣泛使用。

關鍵字：土石流、緩衝設施、廢輪胎、梳子壩設計要點

## Abstract

In recent years, due to slope land developments, debris flows occur frequently in Taiwan. Accordingly, from 2003 to 2008, Slope Land Engineering Lab of Department of Soil and Water Conservation at National Chung-Hsing University had conducted simulation experiments and analyses concerning the effect that *cushion-device (used-tire)-equipped* disaster-prevention structures (slit dams) have on reducing boulder impaction. Through numerous modifications, the experiments conducted in these years all elicited positive results of the effectiveness of cushion devices (used-tires).

This research paper begins with analyses of engineering cases; both their effectiveness and weaknesses of their designs are evaluated. Furthermore, suggestions are proposed concerning problems commonly encountered. In addition, statistic analyses are conducted on the experimental data acquired from 2003 to 2008, proving the effectiveness of cushion devices (used-tires). The implications of the statistics are discussed; moreover, the concepts of impaction force, momentum and energy are introduced respectively as basic constructs in reviewing this boulder impaction reducing mechanism. Lastly, with every experimental design conducted from 2003 to 2008 compared to different impaction points, the effectiveness of cushion devices is again proved

valid.

As conclusion, key points mentioned are applied to discussions of practical use in construction sites. That is, as reference for designers of slit dams, Slit Dam Design Instructions is introduced, illustrating every procedure necessary in conducting such constructions.

**Keywords: debris flow, cushion device, used-tire, Slit Dam Design Instructions**

