

國立中興大學水土保持學研究所 碩士論文

指導教授：周 恒

蝕溝控制透水性節制壩效用之探討

研究生：劉 正 川 撰
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中 文 摘 要

本文目的，旨在研究透水性節制壩，控制蝕溝之功效，以及最經濟有效之壩型。茲將本文摘要分述如下：

1. 前人研究：描述過去學者、專家研究蝕溝形成、分類、沖蝕程序、成長模式、泥砂來源、蝕溝力學、控制方法及淤積坡度等之變化。

2. 野外測驗：僅選定寬5公尺以下之小蝕溝，其壩型計有輪胎節制壩、雙籠節制壩、單籠節制壩三種。

3. 模型試驗：模型計有雙籠、格籠雙籠、單籠透水性節制壩，以及實體不透水節制壩四種。由試驗中，知各類型透水性節制壩承受之總壓力均比實體不透水壩小，約減少6.8~31.4%；在水深20公分時，透水比率約為58.4~70.1%；平均流速為渠道無構造物時之13.9~16.7%，換言之，透水性節制壩約可減少83.3~86.1%之平均流速。

4. 結 論

(1) 由野外測驗知，雙籠節制壩，經過民國66年賽洛瑪颱風之暴雨（22年發生一次之頻率）仍完整無缺，知今後於本省山坡地之蝕溝控制，此種壩型，施工易而經費省，且可就地取材，頗堪適用。

(2) 於理論力學分析中，上凸型節制壩，能將中央主軸柱之壓力，傳向兩岸，並於 $\theta = 90^\circ$ ，中央主軸柱，理論上均無壓力存在，其壓力可分配至兩岸，此為節制壩之較佳構造。

(3) 壩體中石頭粒徑，以採用混合粒徑為較佳，且可就

地取材，施工容易。

從本研究可知，今後本省山坡地蝕溝控制，透水性節制壩和輪胎節制壩，頗堪應用，惟本試驗，尚屬初步探討，其結果僅能提供參考，尚賴學者、專家給予批評指正。

ABSTRACT

The purpose of this research is to study the effect of porous check dams which require low-cost on gully control.

1. Previous research: Gully formation, class, mechanics, erosion process, growth models, the source of sand, control methods, and the gradient of the deposition were reviewed.

2. Field experiment: In the field experiment chose only 5 meter broad gully. Three types porous check dams, such as single fence check dam, double fence check dam, and tire check dam, were used for this study.

3. Model test: Four kinds of model dams, such as single fence, double fence, crib double fence porous check dam, and nonporous concrete check dam, were employed for model test. The results show that the total pressure in the porous check dams was about 6.8-31.1% less than nonporous check dam. In the depth of 20 centimeters, the ratio of permeability was about 58.4-70.1%. The average velocity was about 13.9-16.7% as much as that of the channel without any structure. In other words, porous check dams decreased about 83.3-86.1% of the average velocity.

4. Conclusion:

(1) From the field experiment, we knew in July 1977 for "THELMA" typhoon, (Its recurrence interval years is about 22 years) the double fence check dam still hold on. So, I think this kind of check dam may be used in Taiwan mountain area for gully control. Besides, there are easy to work and require low-cost.

(2) In theoretical mechanics analysis, convex check dams can transmit the pressure of centric pole to the bank, and when $\theta=90^\circ$, theoretically, it has no pressure in centric pole. The pressure is transmitted to the bank. It is better

than any other check dams.

(3) For the required size and gradation of rock on check dams, the fixed grain size may be used. Because it used local material and easy to work with.

From this study, in Taiwan mountain area, for gully control porous check dams and tire check dams may be used. This is only the primary study, and more information will be required for confirming the conclusions we obtained.