

應用二維數值模式推估南化水庫防淤隧道口增設導流槽及主深槽對排砂效率之影響

Using a two-dimensional numerical model to assess the impact of adding diversion channels and main scour channels at the entrance of the Nanhua Reservoir anti-silt tunnel on sediment flushing efficiency. 國立中興大學土木系

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摘 要

因近年來極端氣候影響，臺灣各水庫淤積嚴重影響水庫蓄水功能，為延長水庫壽命及達到永續利用原則，興建防淤隧道減緩水庫淤積問題，因此防淤隧道相關研究也隨之興起，而透過數值模式模擬不僅能省下建構模型的時間及成本，也能更方便的改變地形來達到本研究的目的，本研究透過二維數值模式模擬防淤隧道於洪水事件下運用浚渫船之工法創造主深槽及導流槽，進一步探討導流槽對排砂效率之影響。

本研究運用 SRH-2D 二維數值模式模擬南化水庫中泥沙運移的變化，經由水庫模擬不同主深槽及導流槽參數進行洪水模擬，並在水庫防淤隧道口設置監測點，用以觀察泥沙濃度稀釋程度、泥沙抵達時間，並推算防淤隧道的排砂效率，由於先前南化水庫防淤隧道口並無主深槽及導流槽的設置，因此本研究將有增設主深槽及導流槽模擬結果與原水庫進行比較，分析防淤隧道口有無主深槽及導流槽對排砂效率之影響，以利於未來其他水庫興建防淤隧道之參考指標。

關鍵詞：SRH-2D 防淤隧道

Abstract

Due to the severe impact of extreme weather in recent years, sedimentation in various reservoirs in Taiwan has significantly affected their water storage functions. To extend reservoir lifespan and achieve sustainable utilization principles, anti-silt tunnels have been constructed to alleviate sedimentation issues. Consequently, research related to anti-silt tunnels has emerged. Through numerical modeling, not only can the time and cost of model construction be saved, but it is also more convenient to modify terrain to achieve the objectives of this study. This research uses a two-dimensional numerical model to simulate the use of dredging vessels in anti-silt tunnels during flood events to create main scour channels and diversion channels, further exploring the impact of diversion channels on sediment flushing efficiency.

This study employs the SRH-2D two-dimensional numerical model to simulate sediment transport variations in the Nanhua Reservoir. Different parameters for main scour channels and diversion channels are simulated in flood scenarios through reservoir modeling. Monitoring points are set up at the entrance of the reservoir's anti-silt tunnel to observe the degree of sediment concentration dilution, sediment arrival times, and to estimate the sediment flushing efficiency of the anti-silt tunnel. Since the anti-silt tunnel entrance at Nanhua Reservoir previously lacked main scour channels and diversion channels, this study compares the results of simulations with and without these features against the original reservoir, analyzing the impact of the presence or absence of main scour channels and diversion channels on sediment flushing efficiency. This serves as a reference for the construction of anti-silt tunnels in other reservoirs in the future.

Keywords: SRH-2D, sedimentation-prevention tunnel