

# 利用 THMC 模型模擬桃園地區紅土層下的地下水流動及埤塘影響

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## 摘要

桃園地區作為台灣的重要工業與農業發展區域，擁有數千座埤塘，曾為農業灌溉提供重要水源，隨著工業用水需求的不斷增加，水資源管理面臨巨大挑戰。然而，該地區廣泛分佈的紅土層大幅降低了土壤的滲透性，導致雨水難以有效補充地下水，進一步加劇了水資源不足的問題。本研究應用 THMC 數值模型，針對桃園地區進行地下水流動與水位的模擬，特別是分析地下水水位的變化及其動態行為。研究中將桃園地區的水文與地質條件作為邊界條件，包括地下水的滲透率、不透水面積、抽水量等參數，以精確模擬地下水流動。模擬結果將提供對地下水流動及補注水量的全面理解，分析該地區水文動態，並為水資源管理提供科學依據。未來考慮將埤塘系統整合進模型，探討其在地下水補給與儲存中的潛力。模型結果將有助於應對未來極端氣候挑戰，提升桃園地區的水資源儲存量，為水資源調度與管理提供關鍵數據支持，促進該地區水資源的可持續發展。

**關鍵字：** THMC、地下水水流模型、桃園、地下水、紅土層、埤塘。

# **Using the THMC model to simulate groundwater flow beneath the laterite layer in the Taoyuan area and the impact of ponds**

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## **Abstract**

Taoyuan, a key area for industrial and agricultural development in Taiwan, is home to thousands of ponds that once provided essential water for agricultural irrigation. However, with increasing industrial water demand, water resource management faces significant challenges. The region's extensive laterite layers reduce soil permeability, hindering effective rainfall recharge of groundwater and exacerbating water scarcity. This study applies the THMC numerical model to simulate groundwater flow and levels in Taoyuan, focusing on groundwater level changes and dynamic behavior. The study uses local hydrological and geological conditions, including groundwater permeability, impermeable areas, and pumping rates, to accurately simulate groundwater flow. The results will provide a comprehensive understanding of groundwater flow and recharge volume, offering scientific support for water resource management. Future integration of the pond system into the model will explore its potential in groundwater recharge and storage. The findings will help address future extreme climate challenges, enhance water storage capacity, and provide data to support sustainable water resource management in the region.

**Keywords:** THMC, Groundwater flow model, Taoyuan, Groundwater, Laterite, Ponds.