

## **Applying the variably saturated flow model to simulate groundwater flow in Pingtung plain by using THMC**

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### **Abstract**

The lack of surface water in Pingtung Plain has made groundwater an essential water resource. Meanwhile, the groundwater in this area is abundant, which makes local people tend to use groundwater rather than supply water, resulting in the lowest ratio of tap water use in this area compared with other areas in Taiwan. Overexploitation of groundwater can result in a drawdown in overall groundwater levels, seawater intrusion, and land subsidence. Understanding groundwater flow behavior is crucial for managing wells with sustainable use and management strategies. Additionally, this is an area with high rainfall, and the terrain is conducive to the creation of groundwater. However, constructed objects like roads and buildings have an impact on surface permeability, which is crucial for rainfall infiltration into groundwater. This study uses THMC (Thermal - Hydrology - Mechanics - Chemical) to simulate groundwater flow in the Pingtung plain using the variably saturated flow model. In order to create a model, the study area's surface will be separated into permeable and impermeable areas. Besides, since the study area lacks a pumping rate, groundwater usage rights will be used as the pumping rate input in the model. For the express groundwater flow in Pingtung and other purposes in the sustainable usage plan, a 3-D finite element method flow model is being created.

**Keyword:** Groundwater, variably saturated, THMC, groundwater flow, 3-D flow model, FEM.