

結合 GEMPY 開源模式 建構沿海地區水文地質三維概念模型

報告者：王新博

指導教授：倪春發 教授

報告日期：2022/11/18

摘要

在沿海地區，地下水資源自然會遇到與海水共存的問題，一旦海水過度入侵，會導致土壤鹽化、地表植被或耕作毀損等問題產生，因此需要透過觀測資料與數值模型了解海淡水的交界分布範圍，以及其受潮汐影響所造成的變化。水文地質數值模式模擬工作首重地質概念模型之建立，建構符合現地條件之地質模型可有效降低推估結果之不確定性，並提升水資源計算與評估之精準度。本研究以國立中央大學 TaiCOAST 臨海工作站為目標，進行水文地質調查工作，包括岩心鑽探與地質材料判識、地下水文觀測、水文地質特徵參數等，以 GemPy 開源地質建模套件建置三維地質概念模型，結合 FloPy 進行沿海地區流場模擬，並透過海淡水的水頭變化進行模式驗證。GemPy 是個基於隱式插值方法的開源地質建模套件，可使用岩心所得之資料，透過插值方法建立該地區的地層分布。本研究能夠更有效率的藉由開源軟體建立三維水文地質模型，並串連 python 語言之水流數值模式套件進行地下水流場分析，期望透過大量岩心資料降低地質模型不確定性，提升地下水流場推估之準確性，研究結果也能提供水文地質建模可行方案的參考依據。

關鍵詞：水文地質建模、海淡水交界面、數值模擬分析、流場模擬。

Developing a groundwater model for a coastal area by integrating GemPy and FloPy

Presenter : Hsin-Po Wang

Advisor : Prof. Chuen-Fa Ni

Date : 2022/11/18

Abstract

In coastal areas, groundwater resources will naturally encounter the problem of coexistence with seawater. Therefore, it needs to understand the boundary distribution of seawater and freshwater through observational data and numerical models. range, and how it is affected by tides. The hydrogeological numerical model simulation first focuses on that build a geological conceptual model. The construction of a geological model that can effectively reduce the uncertainty of the estimation results and improve the accuracy of water resources calculation and assessment. This research takes TaiCOAST workstation as the target to carry out hydrogeological work, including core drilling and identification of geological materials, underground water observation, hydrological characteristic parameters, etc. And builds a 3D geological model with GemPy open source suite, combined with FloPy to simulate the flow field in coastal areas. Final check the model through changes in the head of seawater and freshwater. GemPy is an open source geological modeling suite based on implicit interpolation methods, which can use data obtained from cores to set the stratigraphic distribution of the area through interpolation methods. This research can more efficiently build a 3D hydrogeological model with open source software, and connect the flow numerical model package of python language for groundwater flow field analysis. The accuracy of the estimation and the research results can also provide a reference basis for useful method for hydrogeological modeling.

Keyword: Hydrogeological modeling, Seawater and freshwater interface, Numerical simulation analysis, Flow field simulation.