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A COUPLED KARST-POROUS GROUNDWATER MODEL BASED ON THE ADAPTED GENERAL HEAD BOUNDARY

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Abstract

Groundwater in karst aquifer and porous aquifer always have close hydraulic connection. However, groundwater in karst aquifer always behaves as turbulent flow, while the porous groundwater flows in a laminar way. Due to the different flow properties, it is difficult to simulate the connection between the two types of groundwater simultaneously, in one model. This paper aims at designing a coupled model which is able to describe the hydraulic connection between the karst and porous groundwater system. The MODFLOW is applied on the porous groundwater modeling, while a tank model is employed to simulate the karst groundwater system. An Adapted General Head Boundary (AGHB) is designed to couple the MODFLOW and the tank model. The Taiyuan City is taken as the typical study case to evaluate the coupled model. The result shows: (1) the coupled model based on AGHB has satisfied performance for porous groundwater modelling; (2) with AGHB, the karst groundwater head (an unknown variant in general head boundary) could be modeled by the tank model according to the recharge and artificial discharge. The coupled model could simulate the head dynamic of karst groundwater and the lateral discharge automatically; (3) the computation cost of the coupled model is slightly larger than the pure porous model solved by MODFLOW.

Key words: AGHB, coupled model, karst groundwater, porous groundwater

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