Paper (2)

Stochastic Modeling of Saltwater Upconing under Pumping Wells Due to Variability in Hydraulic Conductivity

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ABSTRACT

Costal aquifers that contain freshwater and saltwater are usually stratified, with the more dense saltwater underlying the freshwater. Pumping wells constructed in the freshwater zone cause the interface between two layers to move upwards towards the well. This phenomenon is known as saltwater upconing. The hydraulic conductivity (k) is one of the most important soil parameters that effect the movement of the water interface between salt water and fresh water. This research work has demonstrated the effect of spatial variability of this coefficient by developing a stochastic model for the salt water upconing under pumping wells. The model simulates 3-D shape of Piezometric head and upconing taking into consideration the random distribution of (K). First, the model simulates the steady state of pumping from confined aquifer and predicts the corresponding Piezometric head and upconing interface using inputs of deterministic hydraulic conductivity. Second, the model used the Monte Carlo Simulation to predict random values of K and predict the corresponding Piezometric and upconing interface. Then, the results of two approaches have been compared. Also, this work provides suggestions for controlling the phenomenon of groundwater contamination by saltwater upconing by choosing the safe discharge rate and the safe drilling depth of the pumping well.