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Determine the optimal location of observation wells in an heterogeneous unconfined Aquifer Evaluation of pumping test after Dupuit formel to get a best effective hydraulic conductivity

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The aim of this Research is to determine the best locations of observation wells in an heterogeneous unconfined Aquifer.

we assumed different areas around the pumping well to search and understand the effective hydraulic conductivity in an heterogeneous unconfined Aquifer and to know what means the k_{eff} for any situation of observation wells? and which area it means and how we can make the error minimum? By change the location of observation wells or by increase the number of observation wells. that is depend on the degree of heterogeneity.

the influence of the heterogeneity on the Evaluation of pumping test will be first studied . The geostatistical methods will be used to generate the spatial distribution of K-Value in the field .The spatial distribution of k-Values is generally log-normal distribution The most important parameters of the Variogramm are the Sill and Rang, which will be as variable parameter .

These two parameters will be varied to investigate their influence on the evaluation on pumping test .

The investigated field is divided to cells (with rows and columns). The K-Values in the field are generated by using the program HYDRO-GEN for different variances and integral scales . There are 999 Realisations for each case of variance (sill) and integral scale (range).

The Program Modflow is used to simulate the groundwater table after pumping for some pumping rate Q from the well and for some H . The results of drawdown for each Realisation are used to determine the K-Value through Dupuit-Equation by assuming different distribution of observation wells . This K-Value is compared with the real K-Value for some areas around the well and the standard deviation of the ratio (the calculated of K-Value with Dupuit-formal to generate K-Value) for the 999 Realisations will calculated for each case and its distribution will be considered as error distribution .

The following questions will be here search How is the error distribution in every case ? How the accuracy of the evaluation of pumping test be improved upon with the distribution of observation wells (by inceasing its number and their locations around the well)? How dose the error distribution change when the investigated area is bigger than the area ,which have the observation wells ? and from these question we will get the best location of observation wells.

To answer these questions in heterogeneous Aquifer different observation wells around the well and for different distance to each other will be considered and investigated . Finally the best location of observation wells which have the lower error distribution will be chosen .