



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

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In a pumping test the drawdown of the Groundwater table has to be measured through observation wells to determine the hydraulics conductivity of the field . In a homogenous isotropy Aquifer two observation wells in one line might be enough to determine the hydraulic conductivity K-Value of the Aquifer .In this case ,the contour lines of the groundwater table are circulars and the well lies in the center of these circles . In the nature, the actual drawdowns of groundwater table are not circular .That means that the assumed Model of the homogenous Aquifer is practically non-existent in the nature.

The aim of this Research is to show the discrepancy between the assumed model and the reality. In this Paper the unconfined Aquifer will be here only investigated.

The influence of the heterogeneity on the Evaluation of pumping test will be studied. The heterogeneous field will be described by the geostatistical methods and the distribution of the K-values is assumed as log – normal distribution (sudcky, ), from experience the most variogramm for the distribution of K-values is normal.

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 .From Experience the variogram model for the spatial distribution of K-Values is often exponential variogram , and will be assumed in this work .

The most important parameters of the Variogram are the Sill and Rang (figure ) .

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

The results of drawdown for each Realization 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 Realizations 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 ?

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.

The influence of the variance (sill ) and the integral scale (range ) will be researched and analyzed to all possible locations of observation wells .