



Estimation of hydraulic conductivity using one dimensional electrical resistivity survey

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Groundwater is an important source of water supply. Understanding hydrogeological parameters is necessary before estimating groundwater resource. However, high uncertainty is expected for hydrogeological parameters such as hydraulic conductivity and storage coefficient. Traditionally, these parameters are obtained using pumping tests. Nevertheless, due to high cost, limited data can be collected. The 1D electrical resistivity survey, a relatively low cost method, provides an alternative for estimating hydrogeological parameters. Most studies that use 1D electrical resistivity survey for parameter estimation incorporate Ariche's Law. This law is used to obtain (1) the formation factor and (2) the relationship between the formation factor and field data using a regression equation. Generally, Ariche's Law is used for sandy soil and the effects resulted from clay are usually neglected and a regression equation is usually applied to the entire studied area. This study uses Ariche's Law to develop multiple regression equations for different hydrogeological conditions and takes clay into consideration for parameter estimation. The developed algorithm is applied to estimate hydraulic conductivity of alluvial fan of Chou-Shui River Basin in Taiwan. The fan top is sandy soil. The fan center and fantail have a considerable portion of mud in aquifers. Two regression equations are developed for the parameter estimation of study area.