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An Investigation on the Reciprocity Theory with In-Situ Test at The Heterogeneous Saturated Soil

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In this study, the pumping test of reciprocity between wells is developed for 11 wells located on campus of NYUST. The reciprocity analysis is conducted with the heterogeneous hydrogeological parameters distributions of the site. The mathematical theory of reciprocity implies that choose one as stimulation point and the other as observed response point in two known points at the same random field. Repeat the above action, the response behavior should have the reciprocity between the two points. However, the lack of literature with the in-situ experiment to prove that reciprocity principle. Therefore, this study is expected to investigate the reciprocity of drawdown with the sequential pumping test which will have heterogeneous hydrogeological parameters distributions obtained by inverse method. In general, there are two ways to investigate the reciprocity of pumping tests of two sequential wells. One way is to evaluate the drawdown reciprocity of two sequential wells. From the evaluation the reciprocity of the drawdown behavior during the sequential pumping wells, the reciprocity of the drawdown behavior is investigated. The other one is to estimate cross-correlation between the drawdown behavior of the sequential pumping wells and heterogeneous hydrogeological parameters distributions. The reciprocity of between the drawdown and the heterogeneous parameters distributions is therefore can be investigated. This study proved the reciprocity of drawdown with the sequential pumping test and heterogeneous hydrogeological parameters distributions obtained by inverse method. Meanwhile, we proved the reciprocity is existed during the pumping test in the aquifer.
Keywords: Stimulation, Response, Reciprocity, Cross-correlation