Turbulent flow in the vicinity of the well during the recovery state

P. Dimitriadis

(dimitriadispanos@yahoo.gr)

This paper investigates turbulent flow in the vicinity of the well and focuses on the recovery state. A finite difference solution is developed for transient radially convergent Forchheimer flow to a well based on {Journal of Hydraulic Engineering, Ápproximate Solutions for Forchheimer flow to a well', Mathias S. A., Butler P. A., Zhan H., Sep. 2008}.

The implications of turbulence during the recovery state are investigated. Most of the numerical models assume that turbulent head losses dissipate immediately when pumping ends. This approach does not correspond to reality. During the recovery (after the ceasing of pumping) turbulent head losses still continue to exist and there are cases where they can not be assumed negligible. This behaviour can have an important effect to the estimation of the aquifer's parameters based on the analysis of the data during the recovery area. In this paper, the time needed to pass, after the termination of pumping, for the aquifer to reach laminar flow conditions is estimated away from the well-bore to avoid borehole storage effects, based on {T́urbulent Flow to Wells; Dimitriadis P., MSc H́ydrology for Environmental Management́issertation, Department of Civil and Environmental Engineering, Imperial College, London, supervisor Dr. A. P. Butler, 2007}.

Moreover, a methodology for the estimation of the aquifer's parameters (such as transmissivity, storativity and effective radius) based only in the recovery area is presented for discussion and two step drawdown tests are analyzed and simulated.