Application of stochastic well testing analysis techniques at the Hydrogeological Experimental Site of Poitiers, France

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We provide a geostatistical characterization of the transmissivity distribution of the fractured limestone aquifer constituting the Hydrogeological Experimental Site of Poitiers, France. We use cross-hole pumping test information (also referred to as interference testing) collected during two extensive experimental campaigns performed in 2004 and 2005 and provide an estimate of the key geostatistical descriptors of the spatial variability of the natural logarithm of transmissivity at the site, when the latter is interpreted in a continuous porous medium framework. To do so we apply the stochastic well testing methodology of *Neuman et al.* [2004, 2007]. The latter is based on stochastic type-curves of mean drawdown and associated variance and allows estimating the geometric mean, integral scale, and variance of local log-transmissivities on the basis of quasi steady state hydraulic head data collected during a routine pumping test performed within a randomly heterogeneous aquifer. The reliability of the results is discussed by comparison against previous deterministic analyses performed at the site. The estimated values of integral scales and variance of log-transmissivity are then analyzed in light of multiscale theories which conceptualize the heterogeneity of porous and fractured systems as hierarchical random processes distributed across a multiplicity of scales.