

FROM PARAMETER ESTIMATION OF STOCHASTIC MODELS TO OPTIMAL MONITORING NETWORK-DESIGN

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Summary. To reduce long-term groundwater-monitoring costs, Herrera (1998) developed a methodology for the optimal space-time monitoring-network design. It selects location wells and sampling times such that do not provide redundant information in space and time. The method can be divided into three parts: (1) calculation of the variable estimate uncertainty; (2) construction of the sampling network (selection of sampling well positions and its sampling schedule) and (3) estimation of the variable of interest updating it as data become available. To calculate the variable estimate uncertainty, a space-time ensemble Kalman filter is applied and to choose the well positions and the sampling times for the network, an optimization method is used.

This methodology was applied to a field case in Herrera et al. (2001) and some examples of its use were demonstrated in Herrera and Pinder (2005). The incorporation of a latin hypercube sampling method was introduced to reduce the number of the required random simulations and a genetic algorithm was tested as the optimization method in Zhang et al. (2005). Developments of the methodology in course are: 1) the possibility of selecting sampling depths in the design; and 2) the use of the space-time ensemble Kalman filter for the estimation of the parameters of the stochastic model. A review of the developments of the methodology and the most recent results will be presented in this presentation.

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