



Parameter estimation at the Poitiers site by automatic downscaling

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One of the main problem in the field of groundwater modelling is parameter identification. Because natural hydrosystems are heterogeneous and the knowledge of the spatial distribution of parameters is very incomplete, model calibration may be necessary.

The inverse procedure we have developed is based on the minimisation of an objective function. The minimisation is done by a Quasi-Newton algorithm and the gradient of the objective function with respect to the parameters is obtained by an adjoint state method.

Original work has been done on the parameterization by a downscaling procedure in order to reduce the number of unknowns. This procedure is based on a linear interpolation of the parameter based on a parameter mesh independant of the mesh used for the groundwater modelling. This parameter mesh is successively locally refined depending on the available information and the value of the objective function.

The calibration procedure is applied to the experimental site of Poitiers - France. The aquifer is a fractured limestone aquifer showing strong heterogeneities. Numerous pumping tests have been performed to estimate the flow parameters and their variability.

The calibration procedure allows to determine an ensemble of possible solutions which all match the measured piezometric heads. This ensemble is used to estimate the accuracy of predictions by a Monte Carlo approach.