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Abstract This paper investigates the analytical properties of the sensitivity to the initial conditions on the calibration and simulation results of two karst spring discharge reservoir models, based on the perturbation approach. The emphasis is laid on the influence of model nonlinearity on the sensitivity of the model output to the initial conditions. It is shown that depending on model structure, nonlinearity may either speed up or delay the dissipation of the initialisation bias. The analytical results are confirmed by application examples on real-world simulations.

Key words initialisation bias; initial conditions; global model; perturbation approach; model sensitivity; calibration