On optimal solution error in data assimilation problem for a nonlinear heat-exchange model

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We consider the variational data assimilation problem to identify the initial condition for the 1D vertical heat exchange model governed by a non-stationary heat equation with nonlinear diffusion. We give the operator formulation of the problem and present solvability results. We derive an equation for the error of the optimal initial-value function through the errors of the input data using the Hessian of the misfit functional. The fundamental control functions are used for error analysis. We obtain the error sensitivity coefficients using singular vectors of the specific response operators in the error equation. Numerical examples are presented. The work was supported by the programme ECO-NET (EGIDE), the INTAS project YS 04-83-2818, and the project 04-01-00615 (the Russian Foundation for Basic Research).