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Variational data assimilation for nonstationary 1D vertical heat exchange model

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The problem of variational data assimilation is considered with the aim to identify the initial value function for 1D vertical heat exchange ocean model. The model is governed by the nonstationary heat conduction equation with a nonlinear diffusion coefficient. The data assimilation problem is formulated as an optimal control problem. Properties of the nonlinear operator of the problem are studied. The solvability of the data assimilation problem in specific functional spaces is proved. The necessary optimality condition reduces the problem to the optimality system. The iterative algorithms for solving the optimality system are developed and justified. The results of numerical experiments are presented and discussed.