VARIATIONAL IDENTIFICATION INPUT PARAMETERS IN THE TRANSPORT MODEL OF PASSIVE ADMIXTURE

BASED ON DATA MEASUREMENTS

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The solution of various ecological problems connected with the analysis of possible consequences of the transportation of passive admixtures requires the investigation of the concentration fields formed under the influence of natural or technogenic sources. The process of formation of these fields and their dynamics can be studied by the methods of mathematical simulation. In this case, it is necessary to solve two correlated problems. The first problem is to construct or choose an optimal transport model for an admixture taking into account the nature of its behavior in the marine media. The second problem is to specify the required input parameters of the transport model with regard for the available data of measurements. As the input parameters, we take the coefficients of model equations, the velocity fields, and the initial data.

In the solution of specific ecological problems, it is often necessary to monitor not the space structures of the fields of concentrations of the analyzed admixtures but the values of certain functionals in the investigated area. Thus, we can consider the mean or total concentrations of certain admixtures in the investigated area. These values of functionals can be found directly according to the values of concentration at the nodes of the computational grid. In this case, the values attained at end of the period of integration are determined as a result of the solution of the transport problem with known initial data and the functions of the sources of pollution. Thus, by setting different input data, we obtain a series of concentration fields for which we compute the required functional in the analyzed area. Among these calculations, we can choose the optimal version according to the condition that the functional should not exceed certain admissible values. On the other hand, the solution of problems of this sort can be simplified by using the so-called adjoint equations. In this case, the adjoint problem is solved only once and the values of a functional can be found for various initial fields. The extrema of the solutions of the adjoint problem indicate the areas in the region of integration whose influence on the values of the analyzed functional is maximum in the chosen time interval.