# Formulation and study some inverse problems in modeling of hydrophysical fields in water areas with "liquid" boundaries

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There are different approaches for modeling boundary conditions describing hydrophysical fields in water areas with "liquid" boundaries. Variational data assimilation may also be considered as one of such approaches. Development of computer equipment, together with an increase in the quantity and quality of data from the satellites and other monitoring tools proves that the development of this particular approach is perspective. The range of connected the problems is wide - different recording forms of boundary conditions, observational data assimilation procedures and used models of hydrodynamics are possible.

In this work some inverse problems and corresponding variational data assimilation ones, connected with mathematical modeling of hydrophysical fields in water areas (seas and oceans) with "liquid" ("open") boundaries, are formulated and studied. Note that the surface of water area (which can also be considered as a "liquid" boundary) is not included in the set of "liquid" boundaries, in this case "liquid" boundaries are borders between the areas "water-water". In the work, mathematical model of hydrothermodynamics in the water areas with "liquid" ("open") part of the boundary, a generalized statement of the problem and the splitting method for time approximation are formulated. Also the problem of variational data assimilation and iterative algorithm for solving inverse problems mentioned above are formulated. The work is based on [1].

[1] V.I. Agoshkov, Methods for solving inverse problems and variational data assimilation problems of observations in the problems of the large-scale dynamics of the oceans and seas, Institute of Numerical Mathematics, RAS, Moscow, 2016 (in Russian).