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Domain decomposition method for the Baltic Sea based on theory of adjoint equation and inverse problem.

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Domain decomposition method (DDM) allows one to present a domain with complex geometry as a set of essentially simpler subdomains. This method is particularly applied for the hydrodynamics of oceans and seas. In each subdomain the system of thermo–hydrodynamic equations in the Boussinesq and hydrostatic approximations is solved. The problem of obtaining solution in the whole domain is that it is necessary to combine solutions in subdomains. For this purposes iterative algorithm is created and numerical experiments are conducted to investigate an effectiveness of developed algorithm using DDM. For symmetric operators in DDM, Poincare-Steklov's operators [1] are used, but for the problems of the hydrodynamics, it is not suitable. In this case for the problem, adjoint equation method [2] and inverse problem theory are used. In addition, it is possible to create algorithms for the parallel calculations using DDM on multiprocessor computer system.
DDM for the model of the Baltic Sea dynamics is numerically studied. The results of numerical experiments using DDM are compared with the solution of the system of hydrodynamic equations in the whole domain.

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[2] V.I. Agoshkov, Optimal Control Approaches and Adjoint Equations in the Mathematical Physics Problem, Institute of Numerical Mathematics, RAS, Moscow, 2003 (in Russian).