Domain decomposition method in the problems of oceans and seas hydrothermodynamics based on theory of inverse problems

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Abstract

There are a lot of approaches to the formulation of domain decomposition method. However, some problems connected with the theory and application of domain decomposition method are to be mentioned. The majority of known approaches uses symmetric operators. It may provide simplification of domain decomposition method but it is not acceptable for oceans and seas hydrothermodynamics.

New methodology for constructing the domain decomposition algorithms is based on the theory of optimal control, the results of the theory of inverse and ill-posed problems, the application of adjoint equations and modern iterative processes. Domain is divided into subdomains. To solve subproblems in each subdomain interface conditions are to be set. Some of them become "controls" and are to be found with the solution in subdomains. The second part of interface conditions is written as additional equation to solve the system in terms of least squares. Thus optimal control problem is obtained and it could be solved with the application of known methods. It should be noted that this methodology is applicable to problems with operators of different types, orders and with a different number of independent variables. The work is based on [1].

Domain decomposition method for the Baltic Sea model is numerically studied. The numerical experiments with using and without domain decomposition algorithm are presented and discussed.

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References

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