



Software package for simulation and analysis of non-hydrostatic motions in the density-stratified inhomogeneous ocean

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To carry out the further development of the World Ocean shelf it is necessary to study in detail the physical processes taking place in the coastal zone, the shelf zone and the continental slope.

The topicality of the software package development is determined by the need to create and demand an effective tool optimized for solving a whole class of problems within the mathematical modeling of processes induced by internal waves in the ocean. The possibility of effective computations in this area is extremely relevant for the estimation of risks and the prevention of anthropogenic disasters during the construction of oil platforms and the conduct of economic activities when developing the natural resources of the shelf zone.

This project is aimed at the development of an open source software package for studying hydrodynamic processes in a stratified ocean by numerical simulations on multiprocessor systems. It is proposed to create a modern adapted and verified software tool for solving the applied geophysical problem related to the study of internal gravity waves in the shelf zone of the seas and oceans.

Currently the project is in an active development stage and contains the following modules. 1. Computation module for performing numeric simulation of the initial boundary value problem for a system of equations of hydrodynamics of a nonuniform horizontal and vertical liquid (or model-approximations of various complexity levels) in a region with a geometrically complex configuration (alternating bottom) in the field of gravity and Coriolis force and taking into account additional factors (tidal currents, different types of boundary conditions, external forces, etc.).

2. Computation module of the sea water density field, velocities and non-hydrostatic pressure in the entire thickness of the liquid. 3. Analytical module for spectral and statistical analysis of the computed wavefields.

Acknowledgment: The research was conducted with the support of the Russian Science Foundation Grant No. 17-71-10101.