Storm surges in the closed basins (case study of the Sea of Azov)

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In tideless Sea of Azov a level fluctuations have the different nature connected with seiche, anemo-baric oscillations, and also with storm run-up and run-down phenomena. The latter can have catastrophically effects by virtue of relative shallow water of the reservoir. Storm surges lead to flooding of extensive areas of coast. In the event of run-down, depths in ports and navigation canals decrease, a drying of bottom areas occurs. Construction of adequate physical model of the Sea of Azov storm surges using modern methods of mathematical modeling is the primary object of the work.

In the present study combined hydrodynamical model DHI MIKE is used. Setting and verification of the coupled hydrodynamical model are carried out by an example of extreme surge on October, 28-29th, 1969. Calculations are made for time-varying wind speed and direction. Preliminary calculations have allowed estimating the model sensitivity to the quality of the initial hydrometeorological information, and also to draw a conclusion of applicability of model to problems of calculation of the sea level fluctuations caused by storm action.

It is determined during numerical experiments that extent of storm surges is affected by: direction, force and duration of wind action; air flow stability; relative orientation of a coastal line; local bathymetry (its accuracy under the construction of a water area computational grid); local topography (for the problems of detection of flooding-drying zones of coastal areas).

Use of the coupled three-dimensional hydrodynamical model allows receiving all storm action characteristics, in particular, surface elevation, fields of wind wave and current, flooding-drying zones of coastal areas.