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Solving the problem of damping free oscillations of the water level surface in the Gulf of Finland / Klemin V.V., Korolyova O.A. // Hydrometeorological research and forecasts, 2023, no. 2 (388), pp. 128-137.

The proposed article is the third paper of the authors from Mozhaisky Military Space Academy published in Hydrometeorological Research and Forecasting journal (No. 1 (371) in 2019, No. 2 (380) in 2021), which show how optimization methods (from the classic calculus of variations to modern Pontryagin methods and the method of moments) can be applied for solving specific problems of managing natural processes.

In the present paper, a system of equations was chosen for forecasting storm surges in the Gulf of Finland, which, as calculations based on observations showed, allows predicting the maximum level of water rise at the Neva River mouth with an error not exceeding 10%. An algorithm for solving the problem of damping free oscillations of the water level surface in the Gulf of Finland is proposed. The results of calculations of control actions, as well as the levels of water rise during the damping of a free gravity wave with unilateral and bilateral actions are presented. The results of the calculations on the example of the flood on September 28-29, 1975 showed that when damping the free gravity wave of the storm surge, the maximum level of water rise at the Neva River mouth could be reduced from 280 to 194-195 cm, that is, by 85-86 cm (30%).

Keywords: storm surge, free oscillations of the water surface, control action

Tab. 2. Fig. 3. Ref. 8