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**The application of a parametric method for vertical distribution of temperature and salinity to determine fields of the sea water density**

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**Abstract**

This paper discusses the application of methods of modelling vertical distributions of temperature and salinity to determine the field of density of the water in the Baltic. In order to serve model studies of the steady wind - driven circulation in August. The Baltic has a complex vertical temperature and salinity structure, therefore a parametric method for vertical distributions for multi - layer sea after Felzenbaum's (1974) idea, was applied.

Four temperature and four salinity models were considered. The vertical temperature and salinity structure was approximated by means of polynomials of the  $z$  argument. The polynomial coefficients were calculated from the experimental data using boundary conditions at the sea surface, bottom and interfaces. The methods of preparing the input parameters for the calculations of vertical temperature and salinity profiles were discussed. The water density was calculated by means of the Mamayev formula. The effect of temperature and salinity on density and the approximation errors of temperature and salinity on density approximation error were investigated.

Comparison of the results of calculations with experimental data indicates that although the parametric method considers only the vertical structure of temperature, salinity and density, it does not distort their horizontal distribution. Maximum errors in temperature approximation did not exceed 25 % and in salinity 5 - 8 %, thus those in density calculations were of the order of 5 - 10 %. The density fields obtained were sufficiently smooth, which is essential in numerical models of circulation.

The results of those investigations indicate the advantages and sustainability of the parametric method for the vertical distribution of temperature and salinity when determining the density in the Baltic.