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**ESTIMATING THE INFLUENCE OF ERRORS OF THE APPROXIMATION OF BINARY SOLUTIONS PROPERTIES DEPENDENCES ON CONCENTRATIONS ON THE SOUND VELOCITY VALUE IN SEA WATER.**

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*The attempt to estimate the influence of errors of the approximation of concentration dependences of binary solution densities on the value of sound velocity in sea water by the method presented earlier is made.*

Presently the dependences of thermodynamic properties of sea water and sound velocity in it on the composition of solutes are taken into account with the help of a single variable – salinity  $S$  [1]. Such consideration is justified for oceans and seas connected with oceans by wide passes in which the relation between are constant quantities [1]. The relations between the concentrations mentioned above can vary if the ion concentrations vary [1].

Earlier the method of calculating sound velocity in sea water on the basis of the known ion concentrations was present. The sea water is assumed to be an ideal isopiestic solution i.e. an ideal mixture of binary solutions having the same value of the solvent chemical potential  $\mu_s$ . The mentioned binary solution consists of the solvent and one of the solutes. The pointed method can be used if the values of the sea water properties are known [2].

The influence of the errors of ion concentrations on the sound velocity value is considered in the work [3].

The present work deals with the attempt to estimate the influence of errors of the approximation of the dependences which are used at the calculation on the value of sound velocity in sea water. Derivating the formula for errors of sound velocity can not be made because the used dependences are complex. So we attempt to estimate the error by computer methods.

There are used some dependences of properties of binary solutions on concentrations in the mentioned method particularly the dependences of the water activity and density on concentration. The perturbation which represented the errors of approximation were brought to estimate the influence of binary isopiestic solutions densities dependences on concentration after that the full calculation of sound velocity was realized.

Concentration dependences of binary solutions densities are described by polynomials in which the term which does not contain the concentration is equal to the pure water density. The variation of the pointed term follows the same change in the calculated values on densities of the binary solutions.

Accordingly the calculating procedure [2] in the case of four ions the values of the binary isopiestic solution densities are used for determination of the water activity iteratively and so influences on the next steps of calculating. The calculated values of the binary solutions densities are contained in the formula for calculating sound velocity in the mixed solution.

The realized calculations showed the important influence of errors at the searching for approximation polynomials of the final result.

For example the variation of the pure water density on 0,5% leads to the variation in the calculated sound velocity equal to  $0,7 \text{ mc}^{-1}$  which corresponds the value of relation of the variation of the sound velocity to derivation of sound velocity in the sea water from sound velocity in the pure water equal to 1,7%.

<b>The value of the pure water density</b>	997,00	1001,985	992,015
<b>The density of the isopiestic binary solution of NaCl</b>	1019.934	1024.8379	1014.949
<b>The density of the isopiestic binary solution of Na<sub>2</sub>SO<sub>4</sub></b>	1049.0921	1053.8846	1044.1071
<b>The density of the isopiestic binary solution of MgCl<sub>2</sub></b>	1026.8448	1031.7273	1021.8598
<b>The density of the isopiestic binary solution of MgSO<sub>4</sub></b>	1086.0269	1090.6825	1081.0419
<b>The density of the mixed solution</b>	1023.8400335	1027.9585864	1018.1029659
<b>The sound velocity in the mixed solution</b>	1534.8208748	1534.8274572	1535.5052522

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