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**ANALYTICAL PROPERTIES AND FUNCTIONALITY OF THE SYSTEM FOR CALCULATION OF THE SPATIAL STRUCTURE AND PARAMETERS OF A HYDROACOUSTIC FIELD**

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**ABSTRACT**

The article presents the results of the next phase of the authors' scientific research on the creation of a monitoring system for marine areas based on the development of non-linear low-frequency hydroacoustics and neural network technologies for recognizing object images. The accuracy of the results of the software for calculating the characteristics of a sea medium (the DALNOST program) is estimated. The parameters and structure of the hydroacoustic field, which were calculated from the in-situ measurements of the sound speed inside a vortex disturbance zone observed in the western part of the Sea of Japan are investigated. The obtained results indicate to the practical importance of technique and the DALNOST program as a key element of the AIS structure and provide the possibility for its integration into the systems created for the monitoring of marine water fields to solve the research problems as well as the problems of developing the ocean environment in the interests of the marine science. The sound propagation conditions for distances of 500 km are simulated, the impact of a complex bottom relief and various depths of the sound source on the sonoacoustic signal receiving conditions are shown.

**Keywords:** information-analytical system, beam pattern, sound propagation loss, vortex.

**REFERENCES**

1. Vasilenko A.M., Mironenko M.V., Pyatakovich V.A. and others. *Sistema monitoringa poley istochnikov atmosfery, okeana i zemnoy kory na osnove tekhnologiy nelineynoy prosvetnoy gidroakustiki* [The system for monitoring the fields of the sources of the atmosphere, the ocean and the earth's crust on the basis of the technologies of nonlinear low-frequency hydroacoustics]. Vladivostok. TOVVMU Publ. 2015. 320 p.

2. Mironenko M.V., Vasilenko A.M., Pyatakovich V.A. *Radiogidroakusticheskaya sistema peredachi informatsionnykh voln iz morskoy sredy v atmosferu i obratno* [Radio-hydroacoustic system for transfer of information waves from the marine environment to the atmosphere and back]. Pat. RF no. 2593624; 2016.

3. Mironenko M.V., Vasilenko A.M., Pyatakovich V.A. *Radiogidroakusticheskaya sistema parametricheskogo priyema voln istochnikov atmosfery, okeana i zemnoy kory v morskoy srede* [Radio-acoustic system of parametric reception of waves of sources of atmosphere, ocean and earth's crust in the marine environment]. Pat. RF no. 2593673; 2016.

4. Mironenko M.V., Vasilenko A.M., Pyatakovich V.A. *Sposob peredachi informatsionnykh voln iz morskoy sredy v atmosferu i obratno* [Method of transmission of information waves from the marine environment to the atmosphere and back]. Pat. RF no. 2593625; 2016.

5. Petukhov V.I., Malinovskiy V.E., Vasilenko A.M. and others. *Razvitiye informatsionno-analiticheskoy sistemy prognoza gidrologo-akusticheskoy obstanovki na osnove sovremennykh tekhnologiy* [Development of analytical information system for forecasting of hydrological-acoustical situation based on modern technologies]: Proc. XIVth session of RAS, of the Xth workshop of L.M. Brekhovskikh. Moscow. GEOS Publ. 2004. P. 431–435.

6. *Programma rascheta i analiza parametrov gidroakusticheskogo polya «Dal'nost'»* [The «Dalnost» program for calculation and analysis of hydroacoustic field parameters]: inventor’s certificate no. 2003611941 RF / Vasilenko A.M., Malinovskiy V.E., Alyushin D.A.; 2003.

7. Gost 8.555-91 (MEK 866:1987). *Gosudarstvennaya sistema obespecheniya yedinstva izmereniy. Kharakteristiki i graduirovka gidrofonov dlya raboty v chastotnom diapazone ot 0,5 do 15 MGts* [State system for standardization of measurements. Characteristics and calibration of hydrophones for frequency range of 0.5 to 15 MHz].

8. Petukhov V.I., Malinovskiy V.E., Vasilenko A.M. and others. *Model'noye opisaniye zvukovogo polya v oblasti tsiklonicheskogo vikhrya* [Model-based representation of sound field in a cyclonic eddy]: Proc. XIVth session of RAS, of the Xth workshop of L.M. Brekhovskikh. Moscow. GEOS Publ. 2004. P. 157–161.

9. Lomtev V.L. *O nekotorykh formakh rel'yefa Tikhookeanskoy kontinental'noy okrainy Kamchatki. Rel'yef i struktura osadochnogo chekhla akvatorial'noy chasti Dal'nego Vostoka* [On some forms of the relief of the Pacific continental margin of Kamchatka. The relief and structure of the sedimentary cover of the aquatorial part of the Far East]. Vladivostok. 1981. P. 64–69.

10. Klei K., Medvin G. *Akusticheskaya okeanografiya* [Acoustic oceanography]. Moscow. Mir Publ. 1980. 584 p.