Contract sonar images for Edje Tech Sonar

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Abstract: In this paper was researched the theoretical aspects of the formation of sonar images in fluctuating ocean under conditions when a significant effect on the measured signal is the scattering properties of the marine environment. In the framework of the theory of radiation transfer was researched the inverse problem consisting in determination of the seafloor scattering coefficient. In the approximation of single scattering obtained explicit solution of the inverse problem, and presents the results of theoretical and numerical analysis of the influence of dimensional scattering on the quality of sonar images.

At paper [3] was researched acoustic waves in a fluctuating ocean which based on radiation transfer equation. The solution of this equation gives an explicit solution of the inverse problem in the approximation of single scattering and narrow beam receiving antenna. The equation consist of two components. The first term is useful signal. The second term is interpreted as adjustment in the determining seafloor scattering coefficient, which caused by a dimensional scattering in the ocean.

Numerical experiments were made with fragments of "scan lines" sonar image which obtained from side-scan sonar device on board of the autonomous underwater vehicle. "Scan-lines" are physical sample of reflected signals envelope.

Thus, the authors proposed a digital signal processing algorithm which includes the volume scattering in a medium. This algorithm is allowed to recover the scattering coefficient of the bottom. Authors developed software based on the this algorithm. In the issue numerical experiments with model and real data were performed.

The result of the side-scan sonar is a file containing a data unit and the information obtained during the monitoring of the seabed. In order to visually see the results, you need to format the resulting converted into image format. This algorithm is implemented by means of parallel technologies.

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[3] Prokhorov I.V., Sushchenko A.A. The problem about modeling of the signal obtained with side-scan sonar autonomous underwater vehicle// Proceedings of the International Supercomputer Conference "Scientific service on the internet: all facets of parallelism." Moscow: MSU. 2013. P.546-549.(in Russian)