

THE APPLICATION RESULTS OF SEA WATER AREAS MONITORING WITH ACOUSTIC PROFILER USING ALGORITHMS OF SYNTHESIZING AND FOCUSING

Kasatkin B.A., Kosarev G.V.

Institute for Marine Technology Problems FEB RAS
5a Sukhanov Str., Vladivostok, 690091. E-mail: imtp@marine.febras.ru

ABSTRACT

Acoustic profilers on towed and autonomous carriers are used for studying seabed geological structure and solving certain engineering problems. The experimental research using the developed high resolution acoustic profiler is carried out at the Institute for Marine Technology Problems, Far Eastern Branch of Russian Academy of Sciences (IMTP FEB RAS). Processing of the primary profiler data is fulfilled on the basis of synthetic aperture and focusing algorithms. Comparative analysis of echo signals amplitudes for classification assessment of different soil types is carried out according to experimental results in a number of sea areas. Application of synthetic aperture algorithms with regard to processing the profiler data allows to increase the horizontal range resolution. Similarly, the vertical resolution of the profiler is increased due to focusing effect and the choice of optimal depth of the carrier motion. The practical application examples of the profiler confirm the efficiency of the developed algorithms.

Keywords: acoustic profiler, seabed profiling, aperture synthesis, focusing of radiation.

REFERENCES

1. Kosarev G.V., Larionov Yu.G. *Trudy IX Vseross. konf. «Prikladnye tekhnologii gidroakustiki i gidrofiziki»* [Proc. of the IX All-Russia Conf. "Applied technologies of hydroacoustics and hydrophysics"]. St.-Petersburg, Nauka Publ., 2008, pp. 152–154.
2. Kosarev G.V. *Materialy 3-y Vseross. nauchn.-tekhn. konf. «Tekhnicheskie problemy osvoeniya mirovogo okeana»* [Proc. of the 3rd All-Russia Science-Technical Conf. "Technical Problems of World Ocean Exploration"]. Vladivostok: Dal'nauka Publ., 2009, pp. 201–203.
3. Svininnikov A.I. *Petrofizika zapadnoy chasti Tikhogo okeana i okrainnykh morey vostoka Azii* [Petrophysics of the western part of the Pacific Ocean and marginal seas of the Eastern Asia]. Vladivostok: Dal'nauka, 2004, 279 p.
4. Bonifant W.W.Jr. *Interferometric Synthetic Aperture Sonar Processing: a thesis presented to the Academic Faculty In Partial Fulfillment of the Requirements for the Degree Master of Science in Electrical Engineering*. Georgia Inst. of Tech. 1999, 166 p.
5. Kostousov, A.V., Kostousov, V.B. *Materialy IV Mezhdunar. simp. «Obobshchennye resheniya v zadachakh upravleniya»* [Proc. of the 4th Int. Symp. «The generalized decisions in the tasks of management»]. Ulan-Ude, Burjatija State Univ. Publ., 2008, pp. 74–76.
6. Kasatkin B.A., Kosarev G.V. *Trudy 3-y Vseross. nauchn. tekhn. konf. «Tekhnicheskie problemy osvoeniya mirovogo okeana»* [Proc. of the 3rd All-Russia Science-Technical Conf. "Technical Problems of World Ocean Exploration"]. Vladivostok: Dal'nauka Publ., 2009, pp. 317–319.
7. Kasatkin, B.A., Kasatkin, S.B., Kosarev, G.V. *Sposob profilirovaniya donnykh otlozheniy* [Method of bottom sediments profiling]. Patent RF, no. 2518023, 2014.
8. Kasatkin, B.A., Kasatkin, S.B., Kosarev, G.V. *Sposob profilirovaniya donnykh otlozheniy* [Method of bottom sediments profiling]. Patent RF, no. 2517983, 2014.
9. Zakharov A.I., Kaevitser V.I., Razmanov V.M., Raskatov V.N. *Trudy IX Vseross. konf. «Prikladnye tekhnologii gidroakustiki i gidrofiziki»* [Proc. of the IX All-Russia Conf. "Applied technologies of hydroacoustics and hydrophysics"]. St.-Petersburg, Nauka Publ., 2008, pp. 143–147.
10. Kasatkin B.A., Zlobina N.V. *Doklady Akademii Nauk - Reports of the Academy of Sciences*, 2010, Vol. 432, no. 5. pp. 681–684.
11. Kasatkin B.A., Zlobina N.V., Kasatkin S.B. *Podvodnye issledovaniya i robototekhnika - Underwater Investigations and Robotics*, 2010, no.1(9), pp. 4–13.