DOI: 10.37102/1992-4429_2024_50_04_08

UNDIRECTIONAL HYDROACOUSTIC DIRECTION FINDER FOR LOW FREQUENCY SIGNALS

Yu.V. Matvienko, Yu.A. Khvorostov, A.V. Kamorny

A combined sound receiver is proposed, in which two pairwise orthogonal channels are placed, having a common phase center and rotated relative to each other by 45 degrees, to measure the horizontal components of the vibrational velocity. A model for calculating bearing by such a system is presented. The possibility of reducing the angular dependence of the bearing determination error during summary data processing is substantiated by increasing the number of measurements and dividing the observation horizon into 16 angular sectors.

Keywords: vector-scalar receiver, intensity vector components, angular dependence of direction finding error, signal-to-noise ratio.

References

1. Burdik V.S. Analiz gidroakusticheskih sistem. L.: Sudostroenie, 1988. 392 p. (In Russ.).

2. Seleznev I.A., Jasnikov A.I. Perspektivy primenenija podvodnyh glajderov dlja okeanografii i osveshhenija podvodnoj obstanovki. Obzor po materialam zarubezhnoj pechati. Podvodnye issledovanija i robototehnika. 2023. No. 1 (43). P. 4–13. DOI: 10.37102/1992-4429_2023_43_01_01. EDN: HPVCMN. (In Russ.).

3. Skrebnev G.K. Kombinirovannye gidroakusticheskie priemniki. SPb: Jelmor, 1997. 200 p. (In Russ.).

4. Shhurov V.A., Shheglov S.G., Ivanov E.N. Mobil'nye akusticheskie kombinirovannye priemnye sistemy na osnove avtonomnyh neobitaemyh podvodnyh apparatov. Podvodnye issledovanija i robototehnika. 2012. No. 2(14). P. 4–12. (In Russ.).

5. Zaharov K.L. Chastotno-uglovye harakteristiki gidroakusticheskogo signala pri ispol'zovanii vektorno-fazovogo metoda. Ustojchivoe innovacionnoe razvitie: proektirovanie i upravlenie : nauchnyj jelektronnyj zhurnal. 2014. Vol. 10, No. 3(24). P. 7. URL: www.rypravlenie.ru. (In Russ.).

6. Matvienko Ju.V., Hvorostov Ju.A., Kuleshov V.P. Osobennosti primenenija skaljarno-vektornyh priemnikov zvuka v sistemah kontrolja podvodnoj obstanovki lokal'nyh rajonov. Podvodnye issledovanija i robototehnika. 2022. No. 4 (42). P. 4–15. DOI: 10.37102/1992-4429_2022_42_04_01. EDN: CAMOFW. (In Russ.).

7. Patent № 2811513 RF, MPK G01S 15/00 (2006.01). Pelengator nizkochastotnyh shumovyh signalov dlja mobil'nyh sistem obnaruzhenija maloshumnyh podvodnyh ob#ektov : No. 2023111429 : zajavl. 03.05.2023 : opubl. 12.01.2024, Bjul. No. 2 / Matvienko Ju.V., Hvorostov Ju.A., Glushhenko M.Ju. 10 s. (In Russ.).

8. Patent № 2699923 RF, MPK G01S 3/80(2006.01). Sposob obnaruzhenija podvodnogo istochnika shirokopolosnogo shuma : No. 2019101778 : zajavl. 23.01.2019 : opubl. 11.09.2019, Bjul. No. 26 / Matvienko Ju.V., Hvorostov Ju.A., Kamornyj A.V. 15 p. (In Russ.).

9. Patent № 2784699 RF, MPK G01S 3/80 (2006.01). Ustrojstvo obnaruzhenija podvodnogo istochnika shirokopolosnogo shuma : No. 2022108027 : zajavl. 28.03.2022 : opubl. 29.11.2022, Bjul. No. 34 / Matvienko Ju.V., Hvorostov Ju.A., Kamornyj A.V. 14 s. (In Russ.).

Information about the authors

MATVIENKO Yurii Viktorovich, Dr. Sci., chief researcher
Institute of Marine Technology Problems, Far Eastern Branch of Russian Academy of Science
Address: 690091, Russia, Vladivostok, Sukhanova st., 5a
Scientific interests: ocean acoustics, applied hydroacoustics, vector-scalar hydroacoustic systems, location and detection of sound sources, underwater robotics, hydroacoustic navigation, hydroacoustic complexes and systems
Phone: +7(908)9-821-389
E-mail: ymat33@yandex.ru
ORCID: 0000-0002-4486-3719

KHVOROSTOV Yurii Anatolyevich, lead designer
Institute of Marine Technology Problems, Far Eastern Branch of Russian Academy of Science
Address: 690091, Russia, Vladivostok, Sukhanova st., 5a
Scientific interests: ocean acoustics, applied hydroacoustics, vector-scalar hydroacoustic systems, location and detection of sound sources
Phone: +7(914)7-036-723
E-mail: oss.dvfu@mail.ru
ORCID: 0000-0002-4805-3051

KAMORNY Alexander Valerievich, senior researcher
Institute of Marine Technology Problems, Far Eastern Branch of Russian Academy of Science
Address: 690091, Russia, Vladivostok, Sukhanova st., 5a
Scientific interests: ocean acoustics, applied hydroacoustics, vector-scalar hydroacoustic systems, location and detection of sound sources, underwater robotics, hydroacoustic navigation, hydroacoustic complexes and systems
Phone: +7(924)2-327-605
E-mail: greatsania@mail.ru
ORCID: 0000-0002-9851-2826