

# ESTIMATION OF THE RANGE DETECTION BY NOISE FIELD OF A SMALL-SIZED UNDERWATER VEHICLE

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The work considers the method for determining the detection range of a small-sized underwater vehicle within the framework of interferometric processing. It is based on numerical estimates of the sound field in the shallow sea and experimental data on the spectral characteristics of the noise emission of the object and the background noise of the aquatic area. The conditions for interference patterns formation are analyzed, and its distortions are considered for the numerical experiment conditions.

**Keywords:** underwater acoustics, sound field, oceanic waveguide, noise source, detection, interference structure, hologram, underwater small-sized vehicle.

## References

1. Kuznetsov G.N., Kuz'kin V.M., Pereselkov S.A., Kaznacheev I.V. Spectrogram and localization of a sound source in shallow water. *Phys. Wave Phenom.* 2017. Vol. 25. No. 2. P. 156–163.
2. Kuz'kin V.M., Matvienko Yu.V., Pereselkov S.A. Application of interferometric processing for localization of low-noise sound sources. *Underwater research and robotics.* 2019. Vol. 30. No. 4. P. 49–57.
3. Khvorostov Yu.A., Matvienko Yu.V. Characteristics of own noise emission of a small-sized AUV. *Underwater research and robotics.* 2019. Vol. 30. No. 4. P. 58–53.

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