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DISTANCE MEASUREMENTS WITH INCREASED ACCURACY AT THE TASK OF MOORING OF AUTONOMOUS UNDERWATER VEHICLE

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The paper discusses some aspects of creating a local positioning system for autonomous uninhabited underwater vehicles (AUV) of increased accuracy. It is shown, that the existing systems of mooring of AUV are extremely inefficient. Such systems are complex, expensive in operation, have low positioning accuracy, which varies from 1-2 m (in traditional solutions) to several tens of centimeters in advanced solutions. It is shown, that the majority of positioning systems have a significant drawback: the presence of a "dead zone" that can reach several meters, which is an insurmountable obstacle and does not allow using such systems to carry out the mooring operation of AUV at the final stage.

The paper proposes to solve the problem of precision positioning of AUV in the local coordinate system, while the accuracy of measuring distances between reference points of AUV and reference points of the terminal of communicating (dock) will be three orders of magnitude higher than the accuracy of determining distances by existing systems and be units of millimeters. In this case, the "dead zone" of the mooring system will be absent. Measurement of distances can be carried out up to full contact of AUV with the berthing terminal. At the final stage of mooring, the accuracy of measuring distances can reach fractions of a millimeter and even better. The mooring process of the AUV can be fully automatic. The state of the aquatic environment in which the AUV is located (temperature, pressure, suspended and dissolved components, etc.) will not matter.

To achieve this goal, it is proposed to use a fundamentally new, patented approach to the problem, which consists in the fact that when performing a positioning operation, two fundamentally different processes of propagation of low-frequency wave oscillations are used simultaneously: one is acoustic and the other is electromagnetic. In this case, the received electromagnetic oscillations are used as a reference signal for the received acoustic oscillations. Thus, it is possible to build a phase radio engineering system, which actually provides the solution to the positioning problem of the AUV with high accuracy.

Keywords: mooring system for AUV, alternating magnetic field of low frequency, loop magnetic antenna, acoustic oscillations, acoustic transducer, measurement of the phase difference of electrical signals.

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