Underwater Investigations and Robotics. 2020. No. 1 (31). P. 21–30.

About the accuracy of positioning the underwater module based on measured movement parameters of a towed system

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**ABSTRACT**

The towed underwater module (TUM) is a useful tool for solving problems of the positioning of the underwater objects, the location of which must be clarified during its detailed inspection. Herewith, the accuracy of the determination of the coordinates of the towed module itself relative to the towing vessel is essential for such kind of problems. The use of underwater acoustic navigation means, the systems with ultra-short baseline (USBL) in particular, are limited due to interference affecting the quality of the signals on the receiving antenna. As an alternative, the method is proposed for TUM positioning based on trajectory measurements of parameters of the towed system, which may include calculated values of communication cable parameters in steady-state towing modes, values of ground speed and towing angle, as well as measured cable length, immersion depth, and TUM heading. The paper provides a comparative analysis of various versions of computational algorithms, which allow obtaining estimates of the TUM positioning accuracy in different modes of stationary towing and in the presence of failures in navigation systems operation.

**Key words:** towed underwater module, sonar navigation system, load-bearing communication cable, satellite navigation receiver, coordinate determination algorithms.

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