

ASSESSMENT OF MOTION SAFETY OF A LARGE AUTONOMOUS UNDERWATER VEHICLE

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The problems of ensuring the safe motion of a large autonomous underwater vehicle (AUV) when it passes through sections with different environmental conditions are considered by the example of the development of the Northern Sea Route. An analysis was made of the influence of various environmental conditions - open and coastal water, fast ice and ice conditions - on the safety of the operation of a large AUV. An approach is proposed to assess the vehicle safety in various environments using a dynamic Bayesian network and conditional probability tables. To test the algorithms for controlling the the vehicle motion and the vehicle itself, a digital test site was developed in the form of a stand for simulating the functioning of the AUV. The development of digital twins in the form of software simulators of the vehicle devices and mechanisms made it possible to test control algorithms on the simulation stand both during normal operation of its systems and in the event of malfunctions due to functioning in various environments. The results obtained on a simulation stand for a large AUV operating on the farthest and most complicated part of the Northern Sea Route - the Vilkitski Strait, helped us to assess the safety of the vehicle operation and outline the ways to improve the safety by upgrading the algorithms for controlling the AUV motion in difficult environmental conditions.

Keywords: motion safety assessment, large autonomous underwater vehicle, dynamic Bayesian network, conditional probability tables, statistical test method, digital test site.

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