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AUTOMATIC INSPECTION SYSTEM FOR PROBLEM SECTIONS OF EXTENDED OBJECTS USING AUV

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The article is focused on the development of a system of automatic inspection of problematic sections of extended objects using autonomous unmanned underwater vehicles (AUVs) equipped with technical vision systems (TVS), in particular, multibeam hydroacoustic sonars. The proposed system allows to dynamically build a three-dimensional model of the pipeline in real time on the onboard computer of the AUV on the based-on point clouds received from the STS. Based on this model, the position of the extended object in space and its curvature, as well as the level of pipe sinking into the sea bottom ground are automatically determined. The calculated parameters make it possible to identify potentially dangerous areas subject to deformation or damage. The data obtained should be used to adjust the vehicle mission in order to conduct a detailed follow-up survey of the identified areas of interest, and can also be sent to the operator's post using the hydroacoustic communication channel with the vehicle.

The software implementation of the system is performed in the Python language using open libraries for processing three-dimensional data. Numerical modeling of the pipeline inspection process was carried out in CoppeliaSim environment, the obtained results confirmed the performance and efficiency of the proposed system.

Keywords: unmanned underwater vehicle, inspection of extended objects, point clouds, mathematical model, technical vision system, underwater pipeline, multibeam sonar, underwater operations.

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