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STUDY OF THE INFLUENCE OF A TOWED REPEATER FLOAT ON THE MOVEMENT OF AUV

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The article proposes a computational and experimental method for assessing the motion parameters of an autonomous unmanned underwater vehicle when towing a float along the surface, which provides radio communication between the vehicle and a remote control post, as well as measuring the geographic coordinates of the underwater tethered system. The methodology is based on the analysis of the dependence of the force effects at the ends of the towing cable on the immersion depth and speed of the underwater vehicle with a fixed length of the communication line with the float. To simulate the steady-state motion of the tethered system "underwater vehicle – communication cable – float", the ZONA application program was used, based on numerical integration over the length of the equation of a flexible inextensible thread in a steady flow. Based on the results of the simulation and in accordance with the dependence of the AUV's hydrodynamic resistance on the speed of movement, the requirements for the control actions of its propulsion and steering system were determined. The calculation of the power consumed by the propulsion and steering system for the AUV's steady motion during towing of the float was carried out, based on the results of full-scale tests of the vehicle and pool tests of its vertical thruster. The results of this calculation, carried out for the MMT-3500 AUV developed by IMTP FEBRAS, made it possible to estimate the dependence of its autonomous operating time and range on the speed of steady movement and the immersion depth of the vehicle for the selected length of the communication cable with the repeater float. During the analysis of the results of the calculations, an assessment was made of the speeds of economical movement of the tethered system "AUV – communication cable – float", providing it with maximum cruising ranges.

Keywords: underwater tethered system, AUV, communication cable, repeater float, flexible inextensible line equation, propulsion and steering complex, power consumption for movement, economy speed, autonomy of use, cruising range.

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