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SPECIFIC FEATURES OF A HYBRID UNDERWATER VEHICLE MOTION DYNAMIC MODEL

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When creating hybrid uninhabited underwater vehicle (HUV), one of the main problems is to ensure the specified dynamic properties, taking into account the features of design and the variety of spatial motion modes. To solve this problem, a dynamic model is being developed based on combining the functions of autonomous and remotely controlled underwater vehicles (AUV / ROV). The main elements in the model structure are: a mathematical model of spatial motion with 6-degrees of freedom, computing means of "virtual hydrodynamics", adaptive motion controllers, a combined propulsion and steering system, and an external environment model. The research task is to determine the parameters of the mathematical model (hydrodynamic characteristics, control and disturbing forces, hydrodynamic drag forces, propulsion and maneuvering characteristics of the vehicle) in the cruising and positioning modes. The HUV "Freedom ROV" (Oceaneering, USA) was adopted as a prototype of the HUV for the choice of the geometric shape and basic design parameters. As a result of computational experiments, estimates of the HUV dynamic parameters are obtained, which indicate its performance in the implementation of complex motion modes with the interaction of the entire functional elements. As a consequence, this allows us to develop optimal recommendations for the structure and characteristics of the HUV multitasking information and control system when performing a wide class of underwater technical work.

Key words: autonomous, remotely controlled, hybrid uninhabited underwater vehicle (AUV, ROV, HUV), dynamic and computational models, motion control, hydrodynamics, propulsion and steering systems.

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