

COMPARATIVE ANALYSIS OF ENERGY EFFICIENCY OF STANDARD AND HYBRID UNDERWATER GLIDERS

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This article discusses the development of the design of underwater gliders. One of the most promising ways to increase their efficiency is to equip underwater gliders with an additional propulsion system. The research discusses in detail the design of the glider, which allows to preserve the ability of hydroplaning, but freed from a rather complex system of changing buoyancy. The purpose of this work is to conduct a quantitative comparison of the energy costs of such a constructive scheme — an innovative hybrid vehicle and a standard glider with a buoyancy control system. To assess the effectiveness of the hybrid glider and possible areas of its use, a comparative analysis of its kinematic and energy characteristics was carried out in comparison with similar characteristics of a traditional (standard) glider. This analysis is based on parametric modeling of vehicle dynamics. As a result of the research, it was found that a hybrid underwater glider becomes energetically more profitable than a standard one when operating at great depths, especially in modes with a small trajectory amplitude relative to the depth of immersion. The abandonment of complex hydraulic systems for changing buoyancy in favor of a propulsion system not only simplifies the design of the glider, but also ensures its high maneuverability.

Key words: underwater glider, hybrid glider, energy efficiency, mechanism of change of buoyancy, propulsion system, hydrodynamic resistance, mathematical modeling.

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