

Features of constructing a control system for underwater vehicle angular orientation at large angles of inclination

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The scope of uninhabited underwater vehicles is increasing, problems appear that require control of vehicles at large angles of inclination. At the same time, the applicability of traditional approaches to this problem solution has been poorly studied. The construction of a system for underwater vehicle position control at the large angles of inclination is considered on the basis of the traditional method of controlling the orientation in the Euler—Krylov angles. In the course of the research a general form of the transfer matrix of apparatus angular orientation control system is derived. It is shown that as the angles of inclination increase, the transfer matrix of the system becomes multiconnected. Algorithms for compensation of appearing perturbations are proposed. The obtained results are checked by the mathematical modeling techniques. The compensation algorithms proposed in the work allow expanding the ranges of working angle values and improving the operation quality of the angular orientation control system of existing uninhabited underwater vehicles without significant redesign of its structure.

Keywords: large angles of inclination, trim, position control, underwater vehicle, compensation of cross-links

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