

# ALGORITHMS FOR GROUP CONTROL OF UNDERWATER MOBILE OBJECTS

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The problem of formation control is relevant when searching for objects, surveying a given area, and group monitoring. In the underwater environment, this problem is complicated by restrictions on the frequency of receiving navigation data and the speed of information exchange between underwater robots. The purpose of this article is to develop and study group control algorithms that ensure the given formation and the maintenance of this formation during movement. The article provides an overview of the results in the field of group control of underwater vehicles, provides a mathematical model of the object, navigation system, underwater environment and communication system. The equations of kinematics and dynamics of a solid body in three-dimensional space, supplemented by equations of actuators, are used as a mathematical model. Algorithms for the distribution of moving objects in formation and nonlinear control algorithms for moving in a line are proposed. When constructing the devices, it is assumed that there is a group leader who transmits his coordinates to the rest of the underwater robots. Motion control is synthesized by the method of positional trajectory control in the form of a function of external coordinates. A study was carried out using numerical methods, during which the process of the formation and movement along the trajectory described by straight line segments was studied. The influence of errors in the navigation system and the frequency of data updates on the error of maintaining a given position by a separate underwater robot is investigated.

**Keywords:** group control, mobile objects, underwater environment, movement in formation, virtual formation, group with a leader, allocation of places in formation

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