

EVOLUTIONARY APPROACH TO GROUP ROUTING OF AUTONOMOUS UNDERWATER VEHICLES IN DYNAMIC MULTI-OBJECTIVE MONITORING MISSIONS

Bychkov I.V., Kenzin M.Yu., Maksimkin N.N.

Institute for System Dynamics and Control Theory SB RAS
134 Lermontov Str., Irkutsk, Russia, 664033. E-mail: dstu@icc.ru

Kiselev L.V.

Institute for Marine Technology Problems FEB RAS
5a Sukhanov Str., Vladivostok, 690091. E-mail: imtp@marine.febras.ru

ABSTRACT

Group control problems for autonomous underwater vehicles (AUV) has both theoretical and practical interest associated with performing of search and surveillance works, patrolling and inspection of underwater objects and structures, water areas monitoring and topographic scanning. All these problems can be generalized as group routing problem in the dynamic environment. Evolutionary approach, which is often used for solving such a problem, is based on the combination of genetic algorithms and local search methods and deals with such concepts as adaptability, feature accumulation and optimization of fitness function. Analysis shows that biological mechanism is much similar to technology of group routing in such specific system as population of underwater vehicles. A routing problem solution is built on several successive procedures including multi-objective mission planning with the use of hybrid (genetic) algorithms and topologies like weighted graphs, fitness function evaluation and execution of planned routes. A simulation software system implementing all the necessary computational procedures has been developed.

Keywords: Autonomous underwater vehicles, group control, mission planning, transport routing problem, genetic algorithms

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