

## عنوان مقاله:

A topology control algorithm for autonomous underwater robots in three-dimensional space using PSO

## محل انتشار:

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## خلاصه مقاله:

Recently, data collection from seabed by means of underwater wireless sensor networks (UWSN) has attracted considerable attention. Autonomous underwater vehicles (AUVs) are increasingly used as UWSNs in underwater missions. Events and environmental parameters in underwater regions have a stochastic nature. The target area must be covered by sensors to observe and report events. A 'topology control algorithm' characterizes how well a sensing field is monitored and how well pairs of sensors are mutually connected in UWSNs. It is prohibitive to use a central controller to guide AUVs' behavior due to ever changing, unknown environmental conditions, limited bandwidth and lossy communication media. In this research, a completely decentralized three-dimensional topology control algorithm for AUVs is proposed. It is aimed at achieving maximal coverage of the target area. The algorithm enables AUVs to autonomously decide on and adjust their speed and direction based on the information collected from their neighbors. Each AUV selects the best movement at each step by independently executing a Particle Swarm Optimization (PSO) algorithm. In the fitness function, the global average neighborhood degree is used as the upper limit of the number of neighbors of each AUV. Experimental results show that limiting number of neighbors for each AUV can lead to more uniform network topologies with larger coverage. It is further shown that the proposed algorithm is more efficient in terms of major network parameters such as target area coverage, deployment time, and average travelled distance by the AUVs.

## کلمات کلیدی:

underwater sensor networks, AUV, PSO Algorithm, three-dimensional topology control, distributed artificial intelligence

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