

系统工程

UUV编队协同应召搜索马尔可夫运动目标的方法

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摘要:

采用时齐马尔可夫链来模拟目标的规避运动, 根据事发海域的水深映射图, 估算出马尔可夫运动目标的位置转移概率。无人水下航行器编队在目标初始概率分布和位置转移概率已知的条件下, 根据当前搜索结果不断对目标位置进行预测和更新。编队成员能共享目标位置信息, 以获得较为准确的目标验后分布。然后采用一种新的分区实时贪婪搜索算法, 得到无人水下航行器编队的最优搜索路径, 从而以较高的搜索成功概率与较短的平均发现目标时间完成对目标的应召搜索。最后通过实例仿真, 证明了该方法的有效性和优越性。此方法将对无人水下航行器编队的战法研究具有参考借鉴意义。

关键词: 无人水下航行器 马尔可夫运动目标 应召搜索 协同搜索 转移概率 映射图 贪婪算法

Method of call search for Markovian motion targets using UUV cooperation

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Abstract:

The target motion is described by the model of discrete state, discrete time Markov chain. According to a hospitalibility map of bathygram, the target's probabilistic state transition matrix is figured out. On the basis of target's location distributed information and state transition matrix, unmanned underwater vehicles continually estimate and update the the target's present state. Additionally, by using a new partition real time greedy algorithm, the optimal search paths could be obtained so that unmanned underwater vehicles could complete the task with high success rate and little time cost. This new searching method is proved feasibility and superiority by the results of simulation in the end, and is worthful for the cooperative tactics of multiple unmanned underwater vehicles.

Keywords: unmanned underwater vehicle (UUV) Markovian motion target call search cooperative search transition probability hospitalibility map greedy algorithm

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