海底复杂环境下机器人摆脱障碍物路径优化方法研究

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摘 要：机器人在海底复杂环境下,使用传统的 PSO 路径规划算法存在连续波动问题,这会导致海底机器人速度和位置出现较大的扰动,摆脱障碍物路径优化结果存在较大偏差,对此提出一种改进 PSO 的海底复杂环境下机器人路径摆脱优化方法.在传统算法中引入速度-位置搜索模型,采用用于障碍物约束限制的高维函数和认知函数,在机器人障碍物摆脱的不同阶段及时调整认知系数以及环境系数的取值,获取最佳的摆脱障碍物路径,使海底机器人能高效摆脱障碍物.在粒子数 N 为 200,粒子维度为 10,最大迭代次数为 800 的实验中,使用此算法做出的路径规划结果同最优的路径规划情况具有较高的匹配度,误差控制在 3.5% 以内,障碍物摆脱效果更明显,具有较好的应用价值.

关键词：海底机器人；障碍物摆脱；路径优化；改进 PSO 方法

The Path Optimization Method on Underwater Robots Getting Rid of Obstales

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Abstract： In view of the robot at the bottom of the sea under complicated environment, the traditional PSO path planning algorithm for continuous wave problems, lead to a larger submarine robot speed and position of disturbance, get rid of the obstacles path optimization results, there is a big deviation of an improved PSO underwater robot path out of optimization method under complicated environment, into the speed - position search model in the traditional algorithm, using for high-dimensional function and cognitive function obstacle constraints limit, at various stages of the robot obstacle from the adjust value of cognitive factor and environmental factor, get the best out of obstacles path, make the underwater robot can efficiently get rid of the obstacles. In particle number is 200 N, particle dimension to 10, the maximum number of iterations for 800 experiments, this algorithm make the results of the path planning with the optimal path planning of has high compatibility, error control within 3.5%, the obstacles to get rid of the effect is more obvious, has good application value.

Key words： underwater robot；obstacles avoid；path optimization；improved PSO

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