■ 论文摘要

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凿岩机械手任务规划中遗传算法的适应度函数

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摘　要：多关节凿岩机械手在工作时,完成的是一个在一定工作面上随机的钻孔孔序任务,其孔序规划相当复杂. 作者运用遗传算法规划其钻孔任务序列,通过判断多关节钻臂上每1个关节的运动方向在彼此相邻的3个钻孔位置上的变化趋势,用数值0表示某一关节运动方向变化趋势在相邻3个钻孔上不一致,数值1表示一致,并根据具体工作情况对描述值进行修正. 在此基础上设计了一个基于关节水平来规划凿岩机械手随机钻孔孔序的适应度函数,从而使整个钻孔孔序规划算法简单,收敛速度快,能寻求较优的钻孔孔序. 此方法对于完成其他类型的关节型机械手的钻孔任务和轨迹规划也具有借鉴意义.

关键字：凿岩机械手;遗传算法;任务规划;适应度函数

The adaptive function of genetic algorithm on task planning of the rock-drilling manipulator

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Abstract: The bore sequence of every working face is random to the multi-joint rock-drilling manipulator, so the bore task planning is very complicated. The application of genetic algorithm to bore task planning of the multi-joint tunneldrilling manipulator is discussed in this paper. The direction change of each joint of the manipulator from three contiguous bores is described as the specific value, for example, value"0"is done for the difference of the movement trend and"1"for the consistent trend. The value"1"and"0"can be modified on the basis of the practice. Based on the changing trend of joint, an adaptive function is presented. Simulation shows that applying this adaptive function can find out the global optimal solution and obtain fast convergence velocity. This method can be effectively used for reference to othermulti-robot systems.

Key words:rock-drilling robot; genetic algorithm; task planning; adaptive function