

基于加权矩阵的过驱动并联机构驱动力矩调节法

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摘要 建立了一种平面三自由度过驱动并联机构的运动学方程, 并基于虚功原理和等效力方法得出了其动力学模型。分析了过驱动机构动力学方程逆解问题的特点, 提出用一种新的优化目标(即加权范数最小方法)来协调分配驱动力矩。将驱动器的额定输出力矩与实际工作力矩之间的差值定义为该驱动器的继容力矩, 在此基础上给出了加权系数的选择准则。根据所提出的局部调节或全局调节准则来选择加权系数可以调节相应驱动器输出力矩, 在一定程度上可以均衡各驱动器的继容力矩。数值计算结果表明, 该方法对于防止部分驱动器输出力矩过大和保证系统稳定有一定的作用。

关键词 [自动控制技术](#), [并联机器人](#), [过驱动](#), [驱动力矩调节](#), [加权矩阵](#)

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Approach to coordinate driving torque of redundant actuated parallel manipulator based on weighted matrix

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Abstract Taking over actuated parallel manipulator with planar 3 DOF as subject investigated, it's kinematics equation was presented. Based on virtual work principle and Equivalent force theory, the dynamic model was built. Thereafter, the feature of redundant actuated parallel manipulator inverse solution was analyzed. To extend the system life, a new optimization objective was brought forward for force allocation coordinating, which is named minimum weighted norm approach. Moreover, the rule of weight coefficient selecting was deduced on the basis of the difference between rated torque and real value. With the partial or global rule selected, the output of corresponding actuator can be adjusted accordingly. Thus torque of each joint was balanced and over output was avoided. Therefore the overall performance will be improved. Data calculating and analysis indicate this approach can better prevent the overloading of partial actuators and greatly ensure the system stability.

Key words [automatic control technology](#) [parallel manipulator](#) [redundant actuators](#) [driving torque coordination](#) [weighted matrix](#)

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