

番茄收获机械手奇异性分析与处理

Analysis and treatment of singularity for a tomato harvesting manipulator

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作者	单位
梁喜凤	中国计量学院机电工程学院, 杭州 310018
王永维	浙江大学生物系统工程与食品科学学院, 杭州 310029

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中文摘要:

为解决番茄收获机械手的奇异性问题, 分析了该机械手雅可比矩阵的奇异值和可操作度, 利用阻尼最小二乘法对其奇异性进行处理与仿真试验。结果表明, 番茄收获机械手经奇异性处理后, 阻尼伪逆矩阵的最小奇异值远离零位置, 各关节运动速度和位移变化平缓, 奇异形消失, 系统工作平稳, 满足番茄收获机械手作业要求。

英文摘要:

To solve singularity problems, singular values of Jacobian matrix and the manipulability of a tomato harvesting manipulator were analyzed. The damped least-square method was applied to treat singularity and simulation was made in the motion. The results indicated that the minimum singular values calculated by the damped pseudo-inverse matrix of the manipulator were far from zero position when singular configurations were treated. Moreover, Velocities and positions of all the joints of the manipulator varied regularly and smoothly. Singular configurations were disappeared and the manipulator met the motion requirements for tomato harvesting.

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服务热线: 010-65929451 传真: 010-65929451 邮编: 100026 Email: tcsae@tcsae.org

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