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多指灵巧手考虑渐近稳定性的最优抓持规划

杨洋, 陆震, 张启先

北京航空航天大学机器人研究所, 北京, 100083

OPTIMUM GRASPING PLANNING FOR DEXTROUS HAND BASED ON THE ASYMPTOTICAL STABILITY

Yang Yang, Lu Zhen, Zhang Qixian

Robotics Research Institute, Beijing University of Aeronautics and Astronautics, Beijing, 100083

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摘要 基于抓持刚度和关节刚度、抓持阻尼和关节阻尼的概念,采用拉格朗日方程推导了多指抓持系统的小位移干扰方程并对其进行了模态分析,按照最佳稳定性为目标对多指灵巧手抓持进行了最优化设计以得到最佳的抓持姿态。以 BH-2类人手抓持一圆柱体作为算例显示方法的实用性和有效性

关键词: 机器人 手指 稳定性 最优规划

Abstract: The paper characterizes the grasp stiffness and joint stiffness for the grasping system of a multi fingered dextrous hand, and develops the expressions for the potential energy, kinetic energy and the dissipation function in a grasp. Using a Lagrangian formula, the small displacement disturbance equation for multi-fingered grasping system is introduced and the equation is solved by modal analysis. Based on this work, an optimum grasping planning is formulated as a non linear programming problem so that the grasping system could have ideal asymptotical stability. An example for the BH 2 anthropoid hand grasping a cylinder object demonstrates the applicability and effectiveness of the method.

Keywords: robots fingers stability optimal planning

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