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智能自校正多模态轨迹跟踪控制

李力争¹, 何清华²

(1. 中南大学信息科学与工程学院, 湖南长沙 410083;
2. 中南大学机电工程学院, 湖南长沙 410083)

摘要: 对于类似于机械手的运动轨迹跟踪和定位控制, 为了获得良好的跟踪性能和定位精度, 针对复杂多变的被控对象, 运用智能控制理论, 引入对象过程特征和行为特征的概念, 以对象的过程特征状态和行为特征状态为条件元素, 构造了1个分层递阶高阶产生式跟踪控制系统结构. 系统在运行过程中通过对对象的过程特征和行为特征辨识, 实现控制器参数的自动调节和多模态控制. 为了具体实现该系统结构的应用, 建立用于过程特征辨识、参数校正和控制决策的特征模型, 以及从过程特征状态集、行为特征状态集到参数校正模态集和控制决策模态集的映射关系. 针对机械手的运动特性进行了仿真研究, 仿真结果表明, 该系统结构具有较强的鲁棒性, 是一种行之有效的方法.

关键字: 智能控制; 跟踪系统; 特征模型; 多模态控制

Intelligent self-tuning and multi-mode control of trajectory tracking

LI Li-zheng¹, HE Qing-hua²

(1-College of Information Science and Engineering, Central South University, Changsha 410083, China;
2-College of Mechanical and Electrical Engineering, Central South University, Changsha 410083, China)

Abstract: On the basis of intelligent control theory, a structure of high-order production hierarchical tracking control system is proposed. A manipulator may obtain excellent trajectory tracking behavior and high accurate location control by use of the structure. Two motions of procedure characteristics and action characteristics for controlled object are introduced, and the two characteristic states are used as premise factors in the structure. The system implements controller parameter self-tuning and multi-mode control with the identification of the two characteristics. Specific characteristic models used for procedure characteristics identification, controller parameter self-tuning and control decision are presented for practical application of the system. The mapping from procedure characteristic state set and action characteristic state set to controller parameter tuning mode set and control decision mode set is also set up. A simulation example concerning the motion of manipulators is given. Simulation result conforms the effectiveness of the system.

Key words: intelligent control; tracking system; characteristic model; multi-mode control

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地 址：湖南省长沙市中南大学 邮编： 410083

电 话： 0731-88879765 传真： 0731-88877727

电子邮箱： zngdx@mail.csu.edu.cn 湘ICP备09001153号