短文

基于信息融合估计的离散线性系统预见控制

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摘要

针对期望轨迹和干扰可预见的离散线性最优跟踪问题, 提出了一种基于信息融合估计的预见控制方法. 推导了最优预见控制律的融合估计过程和最优预见性能指标. 建立了包含状态反馈项、目标和干扰前馈补偿项的信息融合预见控制系统, 并分析了其渐近特性和稳态跟踪误差问题. 直流电机系统的仿真结果表明, 信息融合预见控制下的系统跟踪性能随着预见步数的增加而迅速提高并趋于稳定, 且综合考虑跟踪误差与能量消耗时要优于传统预见控制.

关键词　离散线性系统　预见控制　信息融合　最优估计　最优控制

分类号

Information Fusion Estimation Based Preview Control for Discrete Linear System

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Abstract

For the discrete linear optimal tracking problem with previewed desired trajectory and disturbance, a preview control method based on information fusion estimation is presented. The optimal estimation of the optimal preview control law and the optimal preview performance index are derived. An information fusion preview control system is built up, which contains a state feedback control term and feedforward compensation terms of the target and the disturbance. Furthermore, the problems of the asymptotic characteristic and the steady-state tracking error of the preview control system are investigated. Simulation results show that the control performance is enhanced extremely and tends to be stable. Moreover, the information fusion preview control is superior to the traditional preview control when comprehensively considering the tracking error and the energy consumption.

Key words　Discrete linear system　preview control　information fusion　optimal estimation　optimal control

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