

基于混合观测器的非线性系统的脉冲控制

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Impulsive Control Based on Hybrid Observers for Nonlinear Systems

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摘要

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摘要 该文针对基于有限状态自动机的非线性脉冲混合动态系统,设计一种新的脉冲混合观测器,然后应用有限状态自动机理论和Backstepping方法设计了基于混合观测器的脉冲输出反馈控制器,并构造了多Lyapunov函数,通过混合系统的渐近稳定性理论以及多Lyapunov函数法给出整个闭环系统渐近稳定的充分条件,数值仿真验证了该控制器的有效性。

关键词: 有限状态自动机 脉冲控制 Backstepping方法 多Lyapunov函数

Abstract: A new impulsive hybrid observer is firstly designed for nonlinear impulsive hybrid systems based on a Finite State Machine (FSM). Then, a class of impulsive output feedback controller based on the hybrid observer is designed for above systems by applying FSM theory and backstepping method, and a multi-Lyapunov function is constructed. The sufficient condition for asymptotic stability of the whole closed-loop systems is given by applying asymptotic stability theory of hybrid system and multi-Lyapunov function method. Finally, a simulation example is given to illustrate the effectiveness of the controller proposed in the paper.

Keywords: Finite State Machine (FSM) Impulsive control Backstepping method Multi-Lyapunov function

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