一类带有不确定性的时滞系统的控制器设计

杨青, 李树荣

中国石油大学信息与控制工程学院, 东营　257061

摘要　　针对一类带有不确定性的单输入单输出的时滞非线性系统, 提出了一种鲁棒非线性控制算法. 利用反步设计的迭代设计思想, 在每一步构造李亚普诺夫－克拉索夫斯基函数, 用放大不等式的方法获得控制器, 保证闭环系统的稳定性. 以连续搅拌化学反应器为例的仿真结果也验证了控制器具有良好的控制特性.

关键词　　非线性系统, 时滞系统, 李亚普诺夫－克拉索夫斯基函数, 反步设计.

分类号　93D09

Controller Design for a Class of Time Delay Systems with Uncertainty

YANG Qing, LI Shurong

College of Information and Control Engineering, University of Petroleum, Shandong 257061

Abstract A nonlinear robust controller is proposed for a class of single input single output time-delay nonlinear systems with system uncertainty. Based on an iterative procedure known as backstepping, the Lyapunov-Krasovskii functions are constructed at each step. By magnifying inequation at each step, a robust controller can be acquired, and the corresponding closed loop system is stable. The simulation result of two stage CSTR shows that the controller proposed in this paper has well control behavior.

Key words Nonlinear systems　time delay　Lyapunov-Krasovskii function　backstepping.

DOI:

通讯作者