

论文与报告

基于神经网络与多模型的非线性自适应广义预测控制

石宇静, 柴天佑

东北大学自动化研究中心 沈阳 110004

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摘要

针对一类不确定非线性离散时间动态系统, 提出了基于神经网络与多模型的非线性广义预测自适应控制方法. 该自适应控制方法由线性鲁棒广义预测自适应控制器, 神经网络非线性广义预测自适应控制器和切换机制三部分构成. 线性鲁棒广义预测自适应控制器保证闭环系统的输入输出信号有界, 神经网络非线性广义预测自适应控制器能够改善系统的性能. 切换策略通过对上述两种控制器的切换, 保证系统稳定的同时, 改善系统性能. 给出了所提自适应方法的稳定性和收敛性分析. 最后通过仿真实例验证了所提方法的有效性.

关键词 [广义预测控制](#) [自适应](#) [多模型](#) [神经网络](#)

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Neural Networks and Multiple Models Based Nonlinear Adaptive Generalized Predictive Control

SHI Yu-Jing, CHAI Tian-You

Research Center of Automation, Northeastern University, Shengyang 110004

Abstract

In this paper, a nonlinear generalized predictive adaptive control method based on neural networks and multiple models is proposed for a class of uncertain nonlinear discrete time dynamical systems. This approach is composed of a linear robust generalized predictive adaptive controller, a neural network nonlinear generalized predictive adaptive controller and a switching mechanism. The linear robust generalized predictive adaptive controller can ensure the boundedness of the input and output signals in the closed-loop system and the neural network nonlinear generalized predictive adaptive controller can improve the performance of the system. The purpose of using the switching mechanism is to obtain stability and improved system performance simultaneously. Stability and convergence analysis of the proposed adaptive method is given. Finally, simulation examples are included to demonstrate the effectiveness of the proposed method.

Key words [Generalized predictive control](#) [adaptive](#) [multiple models](#) [neural networks](#)

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通讯作者 柴天佑 tychai@mail.neu.edu.cn

作者个人主页 石宇静; 柴天佑

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