

基于 RBF 神经网络的变采样周期时延补偿策略

时维国 1, 卢小永 1, 邵 诚 2

(1 大连交通大学 电气信息学院, 辽宁 大连 116028;

2 大连理工大学 控制科学与工程学院, 辽宁 大连 116024)

摘要: 针对时延的时变性和不确定性, 提出了一种新的变采样周期时延补偿策略. 首先采用具有最佳逼近和全局最优性能的 RBF 神经网络对时延进行预测, 然后将预测的时延值作为采样周期建立变采样周期网络控制系统模型, 再利用最优控制和极点配置相结合的方法设计控制器, 能有效减少计算量, 以及提高系统的控制精度和实时性. 仿真结果表明该方法具有良好的时延补偿效果.

关键词: 网络控制系统; RBF 神经网络; 变采样周期; 时延补偿

Variable Sampling Period Time Delay Compensation

Strategy Based on RBF Neural Network

SHI Wei-guo 1, LU Xiao-yong 1, SHAO Cheng 2

(1 College of Electrical and Information, Dalian Jiaotong University, Dalian 116028, China; 2 School of Control

Science and Engineering, Dalian University of Technology and Engineering, Dalian 116028, China.)

Abstract: According to time-varying and uncertain time delays, a new variable sampling period approach is presented to mitigate the effect of time delay in this paper. Firstly, a RBF neural network with the best approximation and the global optimal performance is adopted to predict the time delay. Secondly, the time delay occurred at current sampling step is taken as the sampling period to establish the networked control system model. Then, a method in combination with optimal control and classical pole placement is used to reduce the amount of calculation and improve the system's precision and real-time performance. Finally, simulation results show that the method has a good effect on time delay compensation.

Key words: networked control system; RBF neural network; variable sampling period; time delay compensation

作者简介:

时维国 男, (1973-), 博士, 副教授. 研究方向为网络控制系统. E-mail: swgdl@163.com.

卢小永 男, (1992-), 硕士研究生. 研究方向为网络控制系统.

邵 诚 男, (1958-), 教授, 博士生导师. 研究方向为复杂工业过程建模与集成优化控制理论.