短文

基于网络服务质量的网络控制器设计

邵奇可, 俞立, 张贵军

1. 浙江工业大学信息学院 杭州 310032

摘要

针对网络服务质量对控制系统性能的影响, 建立了联合网络参数和控制器参数的系统模型. 在此基础上分析了网络控制系统保性能控制器存在的网络参数和控制参数依赖条件, 并且通过求解线性矩阵不等式, 给出了控制器的参数化设计方法. 所设计的控制器在满足一定的网络服务质量摄动范围内, 不仅可以使系统渐近稳定, 而且还能确保系统性能不大于上界. 本文方法给出网络服务质量变化对控制系统性能衰减的一种定量度量, 可以为进一步的网络调度提供理论依据.

关键词　网络控制系统　网络服务质量　保性能控制　线性矩阵不等式

分类号

Networked Controller Design Based on QoS

SHAO Qi-Ke, YU Li, ZHANG Gui-Jun

1. College of Information Engineering, Zhejiang University of Technology, Hangzhou 310032

Abstract

Considering the influence of networked quality-of-service (QoS) on the control performance, a system model combining the network parameters and the control parameters is established for networked control systems (NCSs). Based on this, the condition dependent on the network parameters and control parameters is presented for the existence of guaranteed cost controllers. Furthermore, the parametric design method of the controllers is given by solving the linear matrix inequality (LMI). Within the scope of QoS perturbation, the designed controller can not only make the system asymptotically stable but also guarantee that the system performance index is not greater than the upper bound. The proposed method gives the quantitative relation between the QoS change and the attenuation of control performance, which provides the theoretical accordance for the scheduling of NCS.

Key words　Networked control systems (NCSs)　quality of service (QoS)　guaranteed cost control　linear matrix inequality (LMI)

通讯作者　邵奇可 sqk@zjut.edu.cn

作者个人主页　邵奇可; 俞立; 张贵军

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