



## 长时延网络控制系统的建模与分析

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**摘要:** 针对传感器、执行器为时间驱动, 控制器为事件驱动的长时延网络控制系统, 考虑存在数据包丢失和乱序, 将包含网络的广义被控对象建模为具有时变控制时延的线性离散系统。针对该模型, 利用Lyapunov方法, 给出了与时滞相关的闭环系统渐近稳定的充分条件; 基于线性矩阵不等式(LMI)方法, 给出了保证闭环系统渐近稳定的时延上界的求取方法。仿真结果表明本文的方法是有效的。

**关键词:** 网络控制系统; 时变时延; 渐近稳定

**中图分类号:** TP273

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## Modeling and Analysis of the Networked Control System with Long Delay

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**Abstract:** To deal with the problems of dropout and disorder of data packets in the transform process, the networked control system with long delay, which contains the event driven controller and time driven sensor and actuator, is modeled as a discrete linear system with time varying control delay. Based on this model, the effect of time delay on the performance of closed loop system is analyzed. By using Lyapunov method, the delay dependent stability condition is given, subject to the asymptotic stability. And the solution to obtain the maximum delay, with which the closed loop system remains stability, is achieved by the aid of linear matrix inequality(LMI). Finally, an example is given to validate the effectiveness of the methods presented in this paper.

**Key Words:** networked control system; time vary delay system; asymptotic stability

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