عنوان مقاله:

Modelling and Compensation of Uncertain Time-delays in Networked Control Systems with Plant Uncertainty Using an Improved Robust Model Predictive Control Method

محل انتشار:

ماهنامه بین المللی مهندسی, دوره 33, شماره 6 (سال: 1399)

تعداد صفحات اصل مقاله: 8

نویسندگان:

F. Pouralizadeh Moghaddam - *Faculty of Electrical Engineering & Robotic, Shahrood University of Technology, Shahrood, Iran*

H. Gholizade Narm - *Faculty of Electrical Engineering & Robotic, Shahrood University of Technology, Shahrood, Iran*

خلاصه مقاله:

Control systems with digital communication between sensors, controllers and actuators are called Networked Control Systems (NCSs). In general, NCSs encounter with some problems such as packet dropouts and network induced delays. When plant uncertainty is added to the aforementioned problems, the design of the robust controller that is able to guarantee the stability becomes more complex. In this paper, a method based on Robust Model Predictive Control (RMPC) is proposed to overcome model uncertainty together with unknown delay caused in NCSs. The previous RMPC methods, called Normal RMPC, was proposed to compensate delay or model uncertainty, individually. Hereby, we propose a method, named Improved RMPC, to compensate the effects of delay and model uncertainty on NCSs, simultaneously. The proposed method is based on uncertainty polytope and LMIs (Linear Matrix Inequlities). Also, an experimental evaluation of time-delays in MODBUS networked control systems is proposed. The simulation results show the ability of the proposed method. For comparison, the Normal RMPC is applied as well. The results show that the Normal RMPC has an acceptable performance for time delay compensation, but its performance gets destroyed or even get unstable when the model uncertainty is also considered.

کلمات کلیدی:

Networked Control System Robust Model Predictive Control Network, Induced Delay Uncertainty Polytope Linear Matrix Inequlity