Observer Design for a Class of Nonlinear Discrete Time Systems: Real Time Application to the One-link Flexible Joint Robot

International Journal of Computer Applications
Foundation of Computer Science (FCS), NY, USA

Volume 179
Number 37

Year of Publication: 2018

Authors:
Assem Thabet, Noussaiba Gasmi

10.5120/ijca2018916875

Abstract

This paper demonstrates the observer design for large class of nonlinear discrete time systems. The use of the differential mean value theorem (DMVT) allows transforming the nonlinear error dynamics into a linear parameter varying (LPV) system. This has the advantage of introducing a general condition on the nonlinear functions. To ensure asymptotic stability, sufficient conditions are expressed in terms of linear matrix inequalities (LMIs). For comparison, an observer based on the use of the one-sided Lipschitz condition is introduced. High performances are shown through real time implementation of the one-link flexible joint robot to ARDUINO MEGA 2560 device.

References

Observer Design for a Class of Nonlinear Discrete Time Systems: Real Time Application to the One-link Flexible Joint Robot


Index Terms
Keywords

Discrete time systems, DMVT, One-sided Lipschitz condition, Quadratic inner-boundedness, LMIs