Proceedings of the International Conference on Industrial Engineering and Operations Management
Riyadh, Saudi Arabia, November 26-28, 2019

The Analysis of Adaptive Delta-Modulator in Sliding Mode Control

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Abstract

This paper studies various dynamical features of fixed delta modulator (Δ-M) and adaptive Δ-M. Stability conditions of both systems are formulated using the theory of quasi-sliding mode. Further, the existence of periodic solutions for fixed delta modulator (Δ-M) and its adaptive counterpart, with steady-state inputs and certain parameter values, are investigated. Our results show that fixed Δ-M converges to the periodic-2 orbit whereas adaptive Δ-M converges to periodic-4 orbit. To validate our theoretical results, we consider extensive simulation examples with various behaviors for both systems.