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MODEL FOLLOWING SMC FOR UNCERTAIN AND NOISY SYSTEM BASED ON UNCERTAINTY AND DISTURBANCE ESTIMATION

P. D. SHENDGE, PRASHEEL V. SURYAWANSHI AND B.M. PATRE

Abstract

This paper presents a study pertaining to the effect of sensor noise with Uncertainty and Disturbance Estimator (UDE) in continuous sliding mode control (SMC). Sensor noise is a high frequency phenomenon causing uncertainty in the initial conditions. In time delay control (TDC) estimation - due to numerical differentiation, noise is amplified continuously, tending the system to be uncontrollable. A sliding mode control with UDE is proposed, that overcomes this limitation and the effect of noise can be minimized to a certain extent, with the help of proper selection of estimation filter time constant - _ . The mathematical analysis is included and the same is verified with simulation. The simulation validates the claim that the effect of noise can be limited with help of proper choice of UDE filter time constant.

Key Words: sliding mode control (SMC); uncertainty and disturbance estimator (UDE); sensor noise