World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:10, No:03, 2016

Sliding Mode Control of Bilateral Teleoperation System with Time Delay

Authors : Ahmad Forouzantabar, Mohammad Azadi

Abstract : This paper presents sliding mode controller for bilateral teleoperation systems with robotic master and slave under constant communication delays. We extend the passivity-based coordination architecture to enhance position and force tracking in the presence of offset in initial conditions, environmental contacts and unknown parameters such as friction coefficient. To address these difficulties, a nonlinear sliding mode controller is designed to approximate the nonlinear dynamics of master and slave robots and improve both position and force tracking. Using the Lyapunov theory, the boundedness of master- slave tracking errors and the stability of the teleoperation system are also guaranteed. Numerical simulations show that proposed controller position and force tracking performances are superior to that of conventional coordination controller tracking performances.

Keywords : Lyapunov stability, teleoperation system, time delay, sliding mode controller
Conference Title : ICECSE 2016 : International Conference on Electrical, Computer and Systems Engineering
Conference Location : Paris, France
Conference Dates : March 14-15, 2016