The Exploitation of Balancing an Inverted Pendulum System Using Sliding Mode Control

Authors : Sheren H. Salah, Ahmed Y. Ben Sasi

Abstract : The inverted pendulum system is a classic control problem that is used in universities around the world. It is a suitable process to test prototype controllers due to its high non-linearities and lack of stability. The inverted pendulum represents a challenging control problem, which continually moves toward an uncontrolled state. This paper presents the possibility of balancing an inverted pendulum system using sliding mode control (SMC). The goal is to determine which control strategy delivers better performance with respect to pendulum's angle and cart's position. Therefore, proportional-integral-derivative (PID) is used for comparison. Results have proven SMC control produced better response compared to PID control in both normal and noisy systems.

Keywords : inverted pendulum (IP), proportional-integral derivative (PID), sliding mode control (SMC), systems and control engineering

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