Stabilization control of a two-wheeled triple links inverted pendulum system with disturbance rejection

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Abstract

This paper focuses on the robust controller for triple Links inverted pendulum on two-wheeled system. The development of triple Link inverted pendulum on two-wheeled model using CAD based soft-ware, SimWise 4D is proposed. Interval Type-2 Fuzzy Logic Control (IT2FLC) used as control algorithm for the system. This system is multi input and multi output system which means each motor in this system is controlled by one controller to achieve stability or upright position for these three links. The robustness of the controller is tested by applying disturbance to the model to observe the response from the model to handle the uncertainties. The performance of IT2FLC is compared with Type-1 Fuzzy Logic Control (T1FLC) to demonstrate best controller for the system. The experiment results concerning the angular position for each three Links and the maximum value of disturbance rejection for both controllers are obtained by using heuristic tuning for input and output gain control.