respectively. The pendulum angle is stabilized in less than 2s at each time of applying the external disturbance.

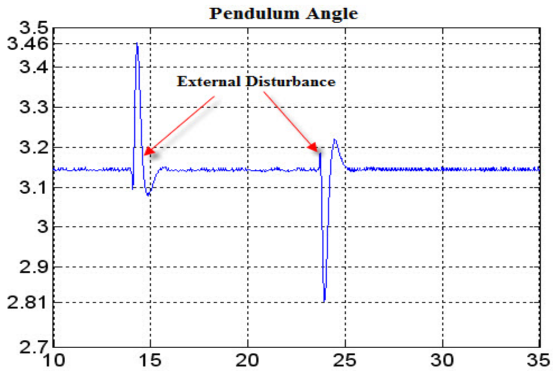

Figure10 Balancing of the Pendulum with external disturbances.

Figure 11 and 12 show the response of the system after changing the reference position from 0 to 0.1 m and vise reverse. It can be seen that the proposed controller is able to stabilize the pendulum system with less than 2 s.

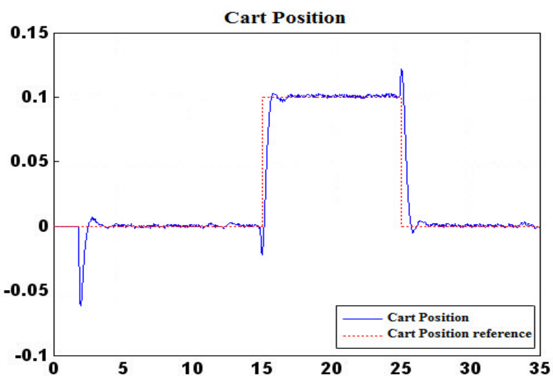

Figure 11 Cart position responses after changing the cart position.

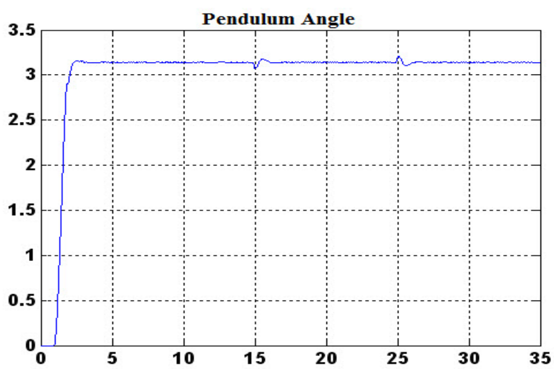

Figure 12 Pendulum responses after changing the cart position.

VI CONCOLUSION

A full state feed back controller using separation factor is proposed to stabilize a real single inverted pendulum. The system desired performance achieved by choosing a pair of poles as the dominant poles and separate the other poles using separation factor. The experimental results show that the proposed controller specified excellent performance, 1.5s settling time and low overshoot. In addition, the system has a good robustness, it can over come any external disturbances on cart or on pendulum rod and stabilize with in 2 s.

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