Abstract

In recent years, the use of electronic throttle valve systems has been very popular in the automotive industry. It is used to regulate the amount of air flow into the engine. Due to the existence of multiple nonsmooth nonlinearities, the controller design to the electronic throttle valve becomes difficult task. These nonlinearities including stick–slip friction, backlash, and a discontinuous nonlinear spring involved in the system. In the first part of this paper the electronic throttle valve system is presented first, and then the model is derived for each components of the throttle valve system. Later, the system dimension is reduced to two by ignoring the motor inductance at the end of this part of work. Actually this step enables us to design a nonlinear PID controller electronic throttle valve system. The simulation results, of applying a nonlinear PID controller to the electronic throttle valve system, show the effectiveness of the proposed controller in forcing the angle of the throttle valve to the desired opening angle in presence of nonlinearities and disturbances in throttle valve system model.

References

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