ABSTRACT

In this research, a new approach to super-twisting sliding mode control of uncertain systems is proposed. The idea behind this control scheme is to utilize a time-varying sliding surface function, in which the slope of the surface is updated online using a simple single input-single output fuzzy logic inference system so that the sliding surface is rotated in such a direction that the dynamic performance of the system under control is improved. Computer simulations are performed on a system with parametric uncertainties and external disturbances. The results are compared with the conventional super-twisting sliding mode controller with a fixed sliding surface. The results have shown the improved performance of the proposed control approach in terms of faster dynamic response compared with the conventional super-twisting sliding mode controller with a fixed sliding surface. The proposed control scheme is stable and robust to parametric uncertainties and external disturbances. Moreover, the proposed control scheme is very simple and easy to implement. Finally, the application of the proposed control scheme is illustrated for Electronic Throttle Control.