Stability Analysis and Controller Design for Uncertain Interconnected Syste

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ABSTRACT

In the variable structure control (VSC) applications, the new VSC based fuzzy controller will reduce chattering phenomenon by adding a smoothing parameter to the discontinuous control. The effect of the smoothing parameter will be analyzed. The problem of stabilization of a class of mismatched uncertain variable structure systems is also investigated in this thesis. The analysis and design is applied to mismatched uncertain interconnected systems. We develop a new decentralized controller which can not only eliminate the chattering problem but also guarantee reaching condition. In addition, we will propose another decentralized sliding mode controller such that the mismatched uncertain interconnected system is exponentially stable. According to Barbalat Lemma, these controllers will force the state trajectory be trapped on the switching surface. On the other hand, we develop a new output feedback sliding mode controller to mismatched uncertain interconnected systems. In order to sustain the limited hitting time, a newly decentralized sliding mode controller is derived to guarantee the existence of the sliding mode by using output feedback only. There is no estimated state required.

Keywords : Variable structure control, Chattering phenomenon, Exponentially stable, Output feedback

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