ABSTRACT

Two control schemes for nonlinear time-delay systems are proposed in this thesis. The purpose of the first scheme is to control a class of uncertain multivariable systems, with relative degree one, nonlinear unmatched state dependent disturbances, and uncertain time-varying state delay. The purpose of the second scheme is to control a class of single-input-single-output systems, with known parameters, arbitrary relative degree, with constant and known arbitrary output delay. Assuming that input delays can be transferred to the output, so the second scheme can be applied to systems with input time-delay. The developed controllers are based on sliding mode control and output feedback, with modulation function to the control signal amplitude. Furthermore, observers estimate unmeasured state variables. In both schemes, global stability properties of the closed loop system are guaranteed. Simulations illustrate the effectiveness of the proposed approaches.

Keywords: Time-delay systems. Nonlinear systems. Sliding mode control. Unit vector control. Output feedback. State observers. Global stabilization.