ROBUST FAULT-TOLERANT CONTROL FOR A CLASS OF SWITCHED NONLINEAR SYSTEMS IN LOWER TRIANGULAR FORM

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ABSTRACT

This paper investigates the problem of robust fault-tolerant control for a class of uncertain switched nonlinear systems in lower triangular form. A system of this class involves parameter uncertainties and unknown nonlinear disturbances. A sufficient condition for the problem to be solvable under arbitrary switching is given in terms of linear matrix inequalities (LMIs). State feedback controllers of subsystems are designed by using the solutions to the matrix inequalities to guarantee global asymptotic stability of the closed-loop systems in presence of actuator failures and under arbitrary switching. A practical system of hybrid haptic display is analyzed to demonstrate the proposed design method.

KeyWords: Switched nonlinear systems, common Lyapunov function, fault-tolerant control, LMIs, actuator failure.