



Design of Decoupling Nonlinear Controllers for Fuzzy Systems

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Received: March 1, 2010; Revised: October 18, 2010

Abstract: The use of linear matrix inequalities and Lyapunov functions is a powerful and commonplace tool for Takagi–Sugeno fuzzy controlled system analysis and synthesis. This paper shows how to split and handle the coupling terms arising from the existence of different input matrices in the subsystems. Then, a method is proposed which allows to synthesize, for a sufficient number of subsystems, the local gains of a nonlinear parallel distributed controller. It is shown that the controller gains depend on the values of the input matrices and of the membership functions, and are thus able to relax classical stability conditions by embedding information on the fuzzy premises.

Keywords: *fuzzy control; stability; nonlinear control; linear matrix inequalities.*

Mathematics Subject Classification (2000): 93D42, 93D15, 93D21.