World Academy of Science, Engineering and Technology
International Journal of Electrical and Information Engineering
Vol:10, No:01, 2016

H∞ Takagi-Sugeno Fuzzy State-Derivative Feedback Control Design for Nonlinear Dynamic Systems

Authors : N. Kaewpraek, W. Assawinchaichote

Abstract : This paper considers an H_∞ TS fuzzy state-derivative feedback controller for a class of nonlinear dynamical systems. A Takagi-Sugeno (TS) fuzzy model is used to approximate a class of nonlinear dynamical systems. Then, based on a linear matrix inequality (LMI) approach, we design an H_∞TS fuzzy state-derivative feedback control law which guarantees L₂-gain of the mapping from the exogenous input noise to the regulated output to be less or equal to a prescribed value. We derive a sufficient condition such that the system with the fuzzy controller is asymptotically stable and H_∞ performance is satisfied. Finally, we provide and simulate a numerical example is provided to illustrate the stability and the effectiveness of the proposed controller.

Keywords : h-infinity fuzzy control, an LMI approach, Takagi-Sugano (TS) fuzzy system, the photovoltaic systems
Conference Title : ICEMPE 2016 : International Conference on Electrical Machines and Power Electronics
Conference Location : Zurich, Switzerland
Conference Dates : January 12-13, 2016