

$H^\infty$  output feedback control of discrete-time stochastic T-S fuzzy models  
with state-dependent noise

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Abstract

In this paper,  $H^\infty$  dynamic output feedback control for discrete-time nonlinear stochastic T-S fuzzy model with state-dependent noise is attacked. We consider the fuzzy T-S models has stochastic uncertainties, i.e., state-dependent noise, in the system matrix, input matrix, and output matrix. First, when the premise variables in the fuzzy plant model are available, an  $H^\infty$  fuzzy dynamic output feedback controller, which uses the same premise variables as the T-S fuzzy model, is proposed for regulation of the controlled system to meet the  $H^\infty$  control performance specification. Next, when the premise variables for building the fuzzy plant model are not available, a fuzzy  $H^\infty$  observer-based state feedback controller, in which the premise variables are the estimated version of the premise variables in the T-S fuzzy model, is proposed. For the two cases, we conduct sufficient conditions described by linear matrix inequalities (LMI) to ensure stability of the closedloop system. Performance of the proposed fuzzy controller is verified by simulation study.

Keyword :  $H^\infty$  control, Output feedback, Stochastic T-S fuzzy model