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**Robust nonfragile  $H_\infty$  filtering for uncertain T-S fuzzy systems with interval delay: a new delay partitioning approach.** (English) [Zbl 1406.93111](#)

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**Summary:** This paper investigates the problem of robust nonfragile fuzzy  $H_\infty$  filtering for uncertain Takagi-Sugeno (T-S) fuzzy systems with interval time-varying delays. Attention is focused on the design of a filter such that the filtering error system preserves a prescribed  $H_\infty$  performance, where the filter to be designed is assumed to have gain perturbations. By developing a delay decomposition approach, both lower and upper bound information of the delayed plant states can be taken into full consideration; the proposed delay-fractional-dependent stability condition for the filter error systems is obtained based on the direct Lyapunov method allied with an appropriate and variable Lyapunov-Krasovskii functional choice and with tighter upper bound of some integral terms in the derivation process. Then, a new robust nonfragile fuzzy  $H_\infty$  filter scheme is proposed, and a sufficient condition for the existence of such a filter is established in terms of linear matrix inequalities (LMIs). Finally, some numerical examples are utilized to demonstrate the effectiveness and reduced conservatism of the proposed approach.

**MSC:**

- 93B36  $H^\infty$ -control
- 93E11 Filtering in stochastic control theory
- 93D09 Robust stability
- 93C41 Control/observation systems with incomplete information
- 93C42 Fuzzy control/observation systems
- 93C10 Nonlinear systems in control theory
- 93C23 Control/observation systems governed by functional-differential equations

**Keywords:**

robust  $H_\infty$  filtering; uncertain T-S fuzzy systems; delay partitioning; robust stability

**Full Text:** [DOI](#)

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