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**Stability analysis of delayed Takagi-Sugeno fuzzy systems: a new integral inequality approach.** (English) [Zbl 1412.37017](#)

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Summary: This paper is concerned with the problem of the stability analysis for Takagi-Sugeno (T-S) fuzzy systems with interval time-varying delay. The delay is assumed to be differential with interval bounds, and has both the lower and upper bounds of the delay derivatives, in which the upper bound of delay derivative may be greater than one. By constructing some delaydependent Lyapunov functions, some stability criteria are derived by using the convex optimization method and new integral inequality techniques. Utilizing integral inequalities for quadratic functions plays a key role in the field of stability analysis for delayed T-S fuzzy systems, and some integral inequalities for quadratic functions are derived and employed in order to produce tighter bounds than what the Jensen inequality and Wirtinger-based inequality produce. Then, less conservative stability criteria are derived by using convex combination method and improved integral inequalities based on appropriate Lyapunov-Krasovskii (LK) functional. Finally, several examples are given to show the advantages of the proposed results.

**MSC:**

- 37B25 Stability of topological dynamical systems
- 93C42 Fuzzy control/observation systems
- 93D20 Asymptotic stability in control theory

**Keywords:**

T-S fuzzy systems; stability; interval time-varying delay; integral inequality; Lyapunov-Krasovskii (LK) functional

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

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