# State Estimation of Stochastic T-S Fuzzy Systems

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## Abstract

Since the T-S fuzzy system can approximate any nonlinear system with arbitrary accuracy, it is also expected to be a suitable approach to observe the states of a stochastic nonlinear system. Up to date, a few state estimators for stochastic T-S fuzzy systems have been proposed and applied to various fields without rigorous proof. In this paper, we first derive a sufficient condition based on the linear matrix inequality theory for the stability of general state estimators. Furthermore, under Gaussian noise assumption, we derive the optimal Fuzzy Kalman Filter for stochastic T-S fuzzy systems. It is shown that from the perspective of conditional estimation, state estimation of a stochastic T-S fuzzy system is actually a linear estimation problem.

Keyword：State Estimation, Stochastic Fuzzy System, Fuzzy Kalman Filter