

SC42050 Literature Assignment

A sum of squares approach to modeling and control

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Description

A new approach to fuzzy control is presented in (Tanaka et al., 2009).

Questions

1. Explain the framework.
2. Compare the approach to that described in (Tanaka et al., 1998).
3. Do you agree with the statement that “The model and stability analysis presented in (Tanaka et al., 1998) is a special case of those described in (Tanaka et al., 2009)”? Motivate.
4. What are the advantages and the shortcomings of the presented approach?
5. Try to find a stable TS system for which the approach does not work. How real is the example?

References

- Tanaka, K., Ikeda, T., and Wang, H. O. (1998). Fuzzy regulators and fuzzy observers: relaxed stability conditions and LMI-based designs. *IEEE Transactions on Fuzzy Systems*, 6(2):250–265.
- Tanaka, K., Yoshida, H., Ohtake, H., and Wang, H. O. (2009). A sum-of-squares approach to modeling and control of nonlinear dynamical systems with polynomial fuzzy systems. *IEEE Transactions on Fuzzy Systems*, 17(4):911–922.