

Universal controller for monotone systems inspired from fuzzy logic control

ABSTRACT

This paper starts with formulation of monotone fuzzy system and then proposes a formula based universal controller for class of monotone systems which is inspired from fuzzy logic control by extending the number of fuzzy sets into infinity. After taking the limit, the fuzzy rule table is replaced by an explicit formula and consequently the needed memory space is minimized. It is shown that this controller can be approximated by a linear state feedback controller followed by a nonlinear saturation function. Furthermore, the optimal control solution and global asymptotic stability for a monotone control system are shown. The experimental results show that the crisp fuzzy-inspired controllers have the same or in some cases better performance and stability with extra merit of lower memory space and cycle time.

Keyword: Monoyone fuzzy system; Rule table; Formula based crisp fuzzy inspired controller