

Ben Ghalia, Mounir; Alouani, Ali T.

A fuzzy variable structure approach to feedback regulation of uncertain dynamical systems, with application to robotics. (English) [Zbl 0872.93050](#)

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Summary: This paper develops a fuzzy logic-based control design methodology for a large class of nonlinear uncertain dynamical systems. The proposed control design approach combines the powerful tools of fuzzy logic and approximate reasoning with the advanced mathematical synthesis techniques used in variable structure control systems theory. The rationale for the proposed control design approach is motivated by the results of a recent study that has rigorously established some connections between fuzzy logic and variable structure control systems. The results of this paper represent a step in the right direction for systematic design of a less expert-dependent fuzzy logic control. To illustrate the merits of the new control approach, the latter is applied to a 2 degree of freedom robot manipulator. Preliminary simulation results suggest that the proposed control design deals effectively with the chattering problem encountered when the classical variable structure control is used alone.

MSC:

[93C42](#) Fuzzy control/observation systems

[93B12](#) Variable structure systems

[93C85](#) Automated systems (robots, etc.) in control theory

Keywords:

fuzzy logic-based control design; nonlinear; variable structure; robot manipulator; chattering

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