Abstract

The main goal of this paper is to present an indirect adaptive fuzzy control of discrete-time non affine nonlinear systems with parametric variations. The synthesis of the state feedback control law is based on the Takagi-Sugeno (T-S) fuzzy models developed by a local description of the considered system. In the first step, the model parameters locally estimated by the fuzzy model are adjusted using gradient method. In the second step, the local control gain based on pole placement is computed. After that, the global state feedback control law is applied to the nonlinear system. Based on the Lyapunov stability theory, the asymptotic stability of the proposed state feedback adaptive fuzzy control method is studied to ensure the global stability of the system. To illustrate the performance of the proposed controller, inverted pendulum and two links robot manipulator arm are presented.

References


Index Terms

Computer Science  Fuzzy Systems

Keywords

Indirect adaptive control, T-S fuzzy model, Discrete-time nonlinear systems, Stability analysis.