



## RECURRENT FUZZY NEURAL NETWORK CONTROL FOR MIMO NONLINEAR SYSTEMS

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**ABSTRACT**—This paper develops a design method of recurrent fuzzy neural network (RFNN) control system for multi-input multi-output (MIMO) nonlinear dynamic systems. This control system consists of a state feedback controller and an RFNN controller. The state feedback controller is a basic stabilizing controller to stabilize the system, and the RFNN controller presents a robust controller to deal with uncertain parts of system dynamics and external disturbances. The adaptive laws of the RFNN parameters are derived based on the Lyapunov synthesis approach and a projection algorithm, so that the stability of the system and convergence of the parameters can be guaranteed. The simulation results for a robotic system and an ecological system confirm the effectiveness of the proposed design method.

**Key Words:** Recurrent fuzzy neural network; MIMO nonlinear system; Robotic system; Ecological system