Adaptive CMAC control system design for a class of nonlinear systems

林志民,鍾招名,許駿飛
Electrical Engineering
Engineering
fei@chu.edu.tw

Abstract

Cerebellar model articulation controller (CMAC) has been already validated that it can approximate a nonlinear function over a domain of interest to any desired accuracy. This paper proposes an adaptive CMAC (PIACMAC) system with a PI-type learning algorithm. The PIACMAC system is composed of a CMAC and a compensation controller. CMAC is used to mimic an ideal controller and the compensation controller is designed to dispel the approximation error between CMAC and ideal controller. The Lyapunov stability theorems is utilized to derive the parameter learning algorithm, so that the uniformly ultimately bounded of PIACMAC system can be guaranteed. Then, the PIACMAC system is applied to a Duffing-Holmes chaotic system. Simulation results verify that the proposed PIACMAC system with a PI-type learning algorithm can achieve better control performance than other control methods.

Keyword：CMAC, Chaotic system.