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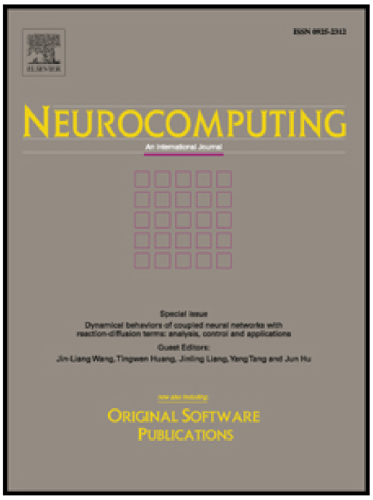

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Abstract

This paper investigates the adaptive neural network optimal output feedback control design problem for nonlinear continuous-time systems with actuator saturation. The system dynamics and states of the controlled system are unknown. A neural network state observer is constructed to estimate the system states. This paper uses two neural networks, one is used to construct the neural network state observer, the other (critic neural network) is used to approximate the cost functions, which comprise an observer-critic architecture. In this architecture, the critic neural network weights are tuned based on both the current data and the previous data, thus the conditions of the persistent excitation in the previous literatures are relaxed. By utilizing adaptive dynamic programming approach, a new observer-based optimal control scheme is developed. It is proved that the proposed adaptive neural network output feedback optimal control scheme can ensure that the whole closed-loop system is stable. Moreover, the estimate errors of the critic neural network weights are asymptotically stable. A simulation example is given to validate the effectiveness of the proposed method.

Keywords: Neural networks, Output feedback, Adaptive dynamic programming, Saturation constraint