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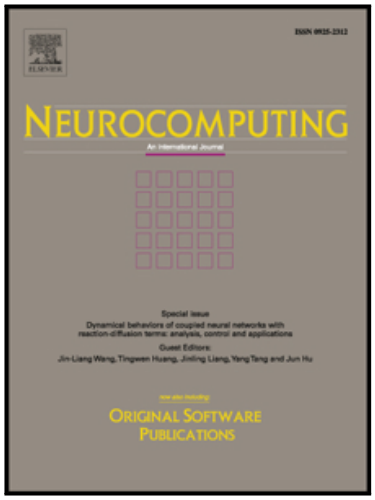

Observer-based fuzzy adaptive optimal stabilization control for completely unknown nonlinear interconnected systems

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Observer-based fuzzy adaptive optimal stabilization control for completely unknown nonlinear interconnected systems

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Abstract

Fuzzy adaptive optimal bounded control problems are first investigated for a class of nonlinear continuous-time interconnected systems whose system internal dynamics and unmatched interconnections are completely unknown, when there exist unavailable states in the subsystems of the interconnected systems. The system states and the interconnection terms of the interconnected system are approximated by using a fuzzy state observer. The decentralized optimal controllers and observer-critic structure are designed according to adaptive dynamic programming and enforcement learning technology. The presented control methods can ensure that the system states and parameter estimation errors of the interconnected systems are ultimately uniformly bounded. A simulation example validates the effectiveness of the presented scheme.

Keywords: Fuzzy logic systems, state observer, adaptive dynamic programming, unknown nonlinear systems, bounded control

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