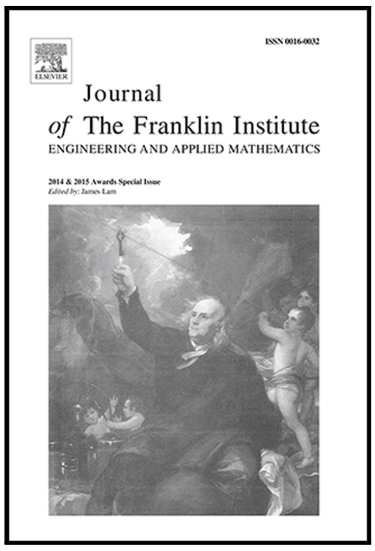

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Global Adaptive Regulation of Stochastic High-order Nonlinear Systems with Unknown Control Direction

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Abstract

In this paper, the global adaptive regulation is considered for a class of uncertain stochastic high-order nonlinear systems with serious nonlinearities and unknowns. For details, the considered systems admit the general forms which include the strict-feedback systems as the special case, and allow the more complicated nonlinearities. Moreover, the system model suffers from both the unknown parameterized nonlinear growth conditions and the unknown time-varying control gain with unknown control direction (i.e. the sign of the control gain). By introducing two new design parameters and skillfully combining the adaptive design methods with the Nussbaum-type function based technique, a desired adaptive regulation control scheme is successfully presented, by which the obtained smooth controller can effectively guarantee that all the closed-loop system states are bounded almost surely, and especially the original system states converge to the origin with probability one. Finally, to demonstrate the feasibility of the control scheme, a numerical example is given.

Keywords: Stochastic high-order nonlinear systems, unknown control direction, unknown parameterized nonlinearity, Nussbaum-type function, global adaptive regulation.

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