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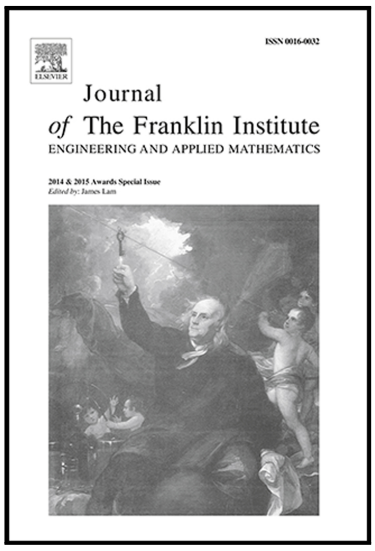

Output feedback control for stochastic nonlinear time delay systems using dynamic gain technique

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Output feedback control for stochastic nonlinear time delay systems using dynamic gain technique

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Abstract

This paper investigates the output feedback control for a class of stochastic nonlinear time delay systems based on dynamic gain technique. The nonlinear terms of the stochastic system satisfy linear growth condition on unmeasured state variables with the output dependent incremental rate, which makes the studied time delay stochastic system more general than the exiting results. Firstly, the full order dynamic gain observer is constructed. Then, the linear-like controller is designed without using recursive design method. Next, the stability analysis is given and a useful corollary is obtained. Finally, a simulation is given to illustrate the effectiveness of the proposed method.

Keywords: Output feedback control, dynamic gain technique, time delay, stochastic nonlinear systems.

1. Introduction

In the past decades, the study on time delay nonlinear systems has attracted many researchers' attention, see [1]–[3] and the references therein. In these existing literatures, there are two main methods, Lyapunov-Krasovskii functional method and the Razumikhin lemma, to be applied to address the time delay problems. Based on these two methods, for the deterministic time delay nonlinear systems, the LMI approach, backstepping design method and dynamic gain method have been used to design the controller in [2]–[5], respectively. In [3], based on the Razumikhin lemma and by using backstepping design technique, the robust state feedback controller was designed. The work [4] further relaxed the condition on the nonlinear terms to

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