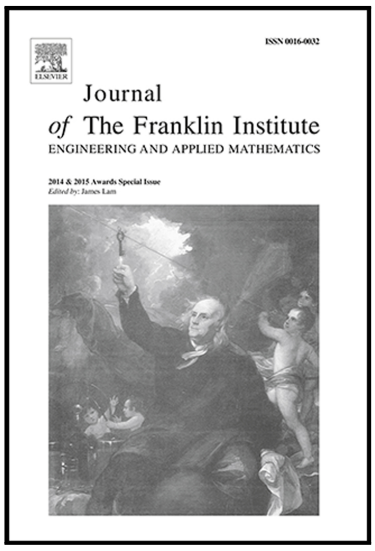

Global asymptotic stabilization for input-delay chained nonholonomic systems via the static gain approach

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Global asymptotic stabilization for input-delay chained nonholonomic systems via the static gain approach[☆]

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Abstract

In this paper, a novel control strategy is proposed for asymptotically stabilizing chained nonholonomic systems with input delay. Firstly, by using the input-state-scaling technique and the static gain control method, the stabilization control problem of such systems is transformed into designing two gain parameters to stabilize a class of generalized feedback systems with state delay. Then, based on the Lyapunov-Krasovskii theorem, the stability analysis of the closed-loop systems is achieved by the appropriate selection of the gain parameters, and the state and output feedback controllers are constructed simultaneously. An illustrative example is also provided to demonstrate the effectiveness of the proposed strategy.

Keywords: Chained nonholonomic systems; Input delay; Static gain method; Lyapunov-Krasovskii theorem.

1. Introduction

Nonholonomic systems represent an important class of control systems, which arises in many mechanical systems such as mobile robots, car-like vehicles, and the knife-edge, see [1, 2, 3, 4] and the references therein. Due to the limitation imposed by Brockett's stability condition in [5], this class of systems cannot be asymptotically stabilized by smooth or even continuous

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