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Modification of the Trajectory Following Method for Asymptotic Stability in a System Nonlinear Control

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Abstract: In this paper, we present the asymptotic stability for a class of nonlinear control systems. To achive the asymptotic stability, we will design a dynamic feedback control. The design of the dynamic feedback control is based on the modification of the trajectory following method. To apply the modification of the trajectory following method, the system will be transformed through the input state linearization.

Keywords: *relative degree of system; input state linearization; zero dynamics; modified trajectory following method.*

Mathematics Subject Classification (2010): 93C10, 93D20.

1 Introduction

In the analysis for nonlinear control systems, there is no general method which can be applied to any nonlinear control system in designing the control input for solving the stability problems. Therefore, in general, the researchers describe some particular nonlinear classes only. Recently, stability problems for nonlinear control systems have been intensively investigated. Daizhan Cheng [1] has discussed the stability problem for a nonlinear system, where the zero dynamic has a multiplicity eigenvalue of 2. Zhengtao Ding [2] has discussed the stability of a nonlinear system through backstepping, where the backstepping design starts from the estimation of the output transformation. In 2004, Chen P *et al*. [3] and Diao L *et al*. [4] introduced the problem of stability through the system transformation, where the transformation of the system is made through dynamic feedback. In 2019, Erkan Kayacan [5] has discussed the Sliding Mode Learning Control (SMLC) of uncertain nonlinear systems with the Lyapunov stability analysis.

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