



Feedback Stabilization of the Extended Nonholonomic Double Integrator

Fazal-ur-Rehman*

*Faculty of Electronic Engineering,
GIK Institute of Engineering Sciences and Technology,
Topi, 23460, Swabi, Pakistan*

Received: February 4, 2005; Revised: July 4, 2005

Abstract: This paper presents a simple control strategy of feedback stabilization for the extended nonholonomic double integrator. The strategy presents a time-varying feedback law based on the model reference approach, where the trajectory of the extended system is chosen as the model reference trajectory. The controllers are designed in such a way that after each time period, the trajectory of the nonholonomic double integrator intersects the trajectory of the model reference, which can be made asymptotically stable. The proposed feedback law is as a composition of a standard stabilizing feedback control for a Lie bracket extension of the original system and a periodic continuation of a specific solution to an open loop control problem stated for an abstract equation on a Lie group. This approach does not rely on a specific choice of a Lyapunov function, and does not require transformations of the model to chained forms.

Keywords: *Feedback stabilization; systems with drift; nonholonomic systems; controllability; Lie algebra; Lyapunov function.*

Mathematics Subject Classification (2000): 34K10, 34B15, 34K25.