Local Stabilization of Switched Affine Systems: An Application to DC-DC Power Switching Systems

By

HORIA PETRE (26035035)

MITCHELL LICHOCKI

MOHAMMED KAMRAN AHMED

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Department of Electrical & Computer Engineering

Concordia University

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Abstract

This technical report presents the results of applying a novel procedure to derive switching laws for switched affine systems. The procedure derives a discontinuous control law from a continuous one, , such that the controlled affine system is rendered asymptotically stable in a small neighborhood of the origin. This methodology is then applied to the control of a dc-dc converter.

1. Introduction

A nonlinear affine system is a system of the form , in which the input u is linearly related to the function G(x). Affine systems are not guaranteed to be stable, that is, to converge to an equilibrium point. They can become stable if a switching law takes the value of a known subsystem, among N subsystems available. Such a switching strategy can render the system globally asymptotically stable, that is, all system trajectories go to equilibrium point as time goes to infinity.

However, there are switched affine systems that can be stabilized only locally.

1. Problem Statement
2. Literature Review
3. Problem Formulation
4. Analysis
5. Simulation Results
6. Comparative Study
7. References

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1. Appendix