Synchronization and Non-Smooth Dynamical Systems

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Abstract In this article we establish an interaction between non-smooth systems, geometric singular perturbation theory and synchronization phenomena. We find conditions for a non-smooth vector fields be locally synchronized. Moreover its regularization provide a singular perturbation problem with attracting critical manifold. We also state a result about the synchronization which occurs in the regularization of the fold-fold case. We restrict ourselves to the 3-dimensional systems ($\ell = 3$) and consider the case known as a *T-singularity*.

Keywords Regularization · Vector field · Constrained system · Singular perturbation · Non-smooth vector field · Sliding vector field · Synchronization

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1 Introduction

The main goal of this paper is to establish an interaction between three important themes of the qualitative theory of non-smooth dynamical systems:

- synchronization phenomena,
- sliding vector fields (also known as Filippov systems) and
- singular perturbation.

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