Introduction to nonsmooth dynamical systems

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Contents

- ▶ Lecture 1. Introduction and motivations
    1. Motivations for studying nonsmooth dynamical systems
    2. An archetypal example: a RLC circuit with an ideal diode
    3. Basics on convex and nonsmooth analysis
- ▶ Lecture 2. Mathematical formulations and results
    1. Mathematical formalism (Differential inclusions and variational inequalities, complementarity systems)
    2. Existence and uniqueness results.

    Practical work : study of a slider with friction and basic circuits with a diode.
- ▶ Lecture 3. Stability in nonsmooth dynamical systems.
    1. Computation of equilibria
    2. Lyapunov Stability.

    Practical work : Stability and bifurcations in electrical circuits and mechanical systems with friction.
    Practical work : Simulation of a Diode-bridge with the Siconos software.
    Illustrations of large scale systems.

Objectives

▶ To be acquainted with the standard notation and definitions of nonsmooth dynamical systems.
▶ To know the standard tools for mathematical analysis.
▶ To know how to state the stability of nonsmooth dynamical systems

References

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[4] R.I. Leine and H. Nijmeijer. *Dynamics and Bifurcations of Non-Smooth Mechanical Systems.* Lecture Notes in Applied and Computational Mechanics 18. Springer verlag, 2004.