

A short Introduction to Sliding Mode Control

Robust Control for Nonlinear Systems

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Sliding Mode Objectives



Objectives of this class of **nonlinear** control?

- Robustness versus uncertainties / perturbations
- Finite time convergence towards the control objectives

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Remark

Sliding mode as a phenomenon may appear in a dynamic system governed by ordinary differential equation with *discontinuous right hand side*

Some Remarks on SMC

This is a text in second frame. For the sake of showing an example.

- Good youtube video from Ali Nasir: [▶ Link](#)

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- Text visible on slide 4

A motivating Example for SMC

Example

Sliding mode of the system [1]:

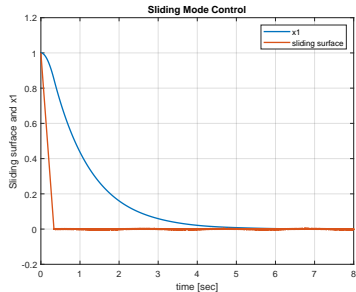
$$\ddot{x} = \sin(3t) + u \quad (1)$$

with sliding surface

$$s = c\dot{x} + x \quad (2)$$

with control law

$$u = -M \operatorname{sgn}(s) \quad (3)$$



Simulation results for $M = 3$
and $c = 1 \text{ s}^{-1}$

If the system is in sliding mode, *i. e.* $s = 0$, the dynamics is $s = \dot{x} + x = 0$ and therefore independent of system parameters or disturbance \rightsquigarrow robust !

Sample frame title



In this slide, some important text will be highlighted because it's important. Please, don't abuse it.

Remark

Sample text

Important theorem

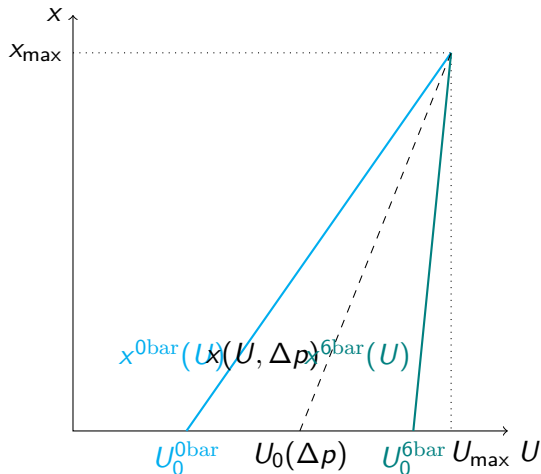
Sample text in red box

Examples

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TikZ Test

Hello world



References



- [1] Vadim I. Utkin et al. *Road map for sliding mode control design*. 6330 Cham, Switzerland: Springer, 2020. ISBN: 978-3030417086. DOI: 10.1007/978-3-030-41709-3.