A short Introduction to Sliding Mode Control

Robust Control for Nonlinear Systems

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Sliding Mode Objectives

FESTO

Objecitves 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

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- Good youtube video from Ali Nasir: Link

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A motivating Example for SMC

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Example

Sliding mode of the system [**utkin2020**]:

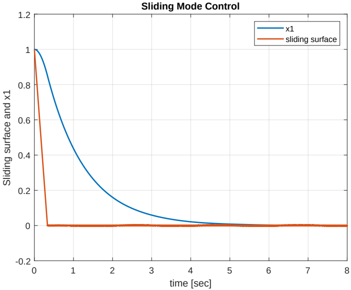
$$\ddot{x} = \sin(3t) + u \tag{1}$$

with sliding surface

$$s = c\dot{x} + x \tag{2}$$

with control law

$$u = -M\,\mathrm{sgn}(s) \tag{3}$$



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

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

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Remark

Sample text

Important theorem

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Examples

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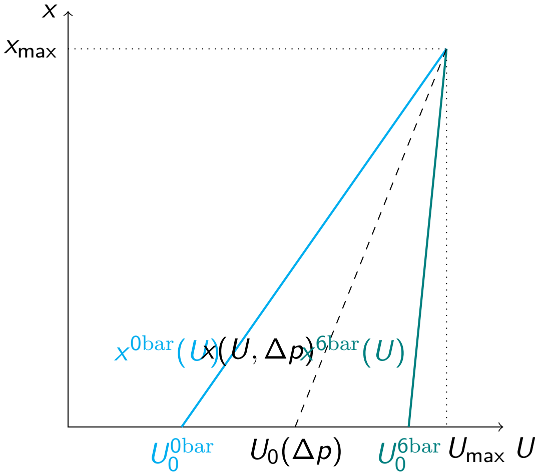
TikZ Test

Hello world



References