A short Introduction to Sliding Mode Control

Robust Control for Nonlinear Systems

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Control Methods in Robotics, August 2021

Sliding Mode Objectives

Objecitves of this class of nonlinear control?

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- 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*

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Some Remarks on SMC

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A motivating Example for SMC

Example

Sliding mode of the system [1]:

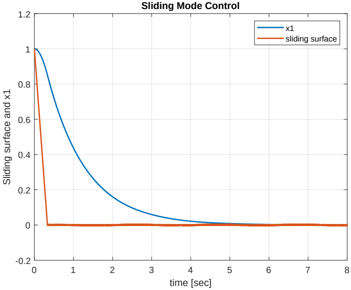
$$\ddot{x} = \sin(3t) + u \tag{1}$$

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 $c = 1\ \mathrm{s}^{-1}$

Remark

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

Sample frame title

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Remark

Sample text

Important theorem

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Examples

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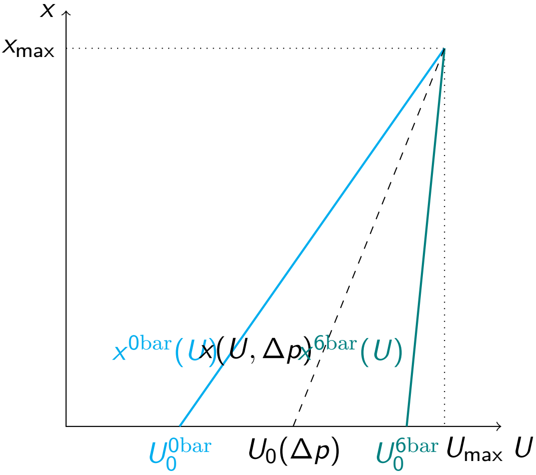
TikZ Test

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.