EDITOR´S NOTES

CONTENT

1. Chattering free sliding mode control is a CONTRADICTION
2. Usage of Super-Twisting Algorithm
3. Adaptive SMC
4. Fixed - time convergence
5. Book **chapters**
6. **Simulations**

1. CHATERRING FREE SLIDING MODE CONTROL IS A CONTRADICTION

SLIDING MODE MEANS INFINITE GAIN

FINITE TIME CONVERGENCE MEANS INFINITE GAIN

CHATERRING FREE SLIDING MODE CONTROL

IS A

CONTRADICTION!!!

2. THE USAGE OF STA

1. Standard Super-Twisting algorithm CAN NOT be used for compensation of state depending uncertainties
2. For the case of uncertain control gains for Generalized STA should be carefully designed

3. Adaptive SMC

When the upperbounds of derivative of perturbations is known and perturbation are Lipschitz there is no reason to adapt k-th order SMC. It is enough to upgrade SMC till the (k+1)th order continuous SMC.

The only insteresting case for STA adaptation is the case when the borders of uncertainties are unknown

3. Adaptive SMC

When the upperbbounds for derivative of perturbations are unknown and convergence time and zone of convergence depends on the upperbounds of UNKNOWN perturbations

it is looking like it will converge but

– I do not know where

– I do not know when

The insteresting result is the convergence to the zone which does not depends on perturbation!!!

This problem reminds to be open

4. FIXED time convergence

It is necessary to distinquish

1. Uniform convergence with respect to initial conditions

2.Uniformly convergent controller is a controller for which the upperbound of convergence time could be estimated in the terms of controller gains

Fixed time controller(inverse problem!)

In this case the controllers gains should be ajdusted basing on desired convergence time!

This problem is still open

4. FIXED time convergence

Levant (2013)

Fixed time convergence can not be ralized with Eurler discretization

OPEN PROBLEMS

1. To find apropriate discrtization to relaize fixed-time conevrgence
2. To find a reasonable problem statement for which fixed-time controller can be realized

Book **Chapters**

- Do not submit chapters connected with one paper only.
- Avoid copy- paste from other work.
- Do not repeat previously published graphs.
- Avoid the sentences like “chattering free sliding mode”
- Present a letter reporting on the novelty, which describes the difference between the chapter and the papers summarized and certifying there is no plagiarism.

ZOOMS are necessary

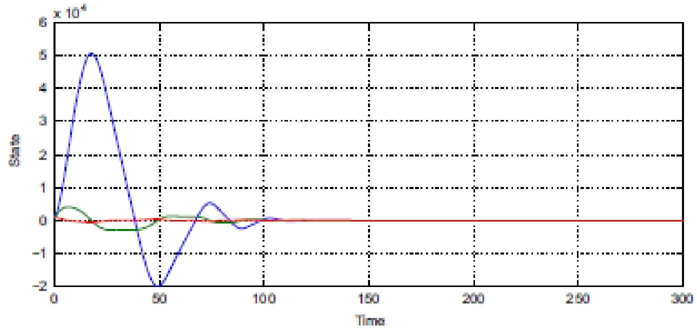

Fig. 11. Graphs of the system states (10) with disturbance $\xi(t) = \sin(1000t)$ upon applying the control law (11) with initial conditions $x_{10} = 1000$, $x_{20} = 1000$.

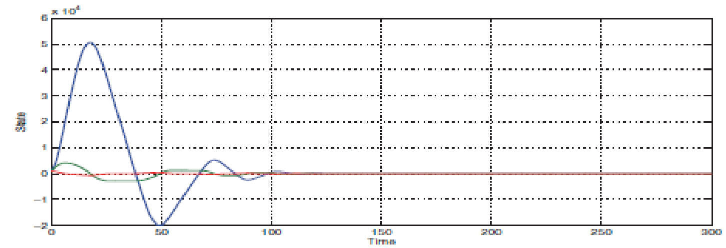

Fig. 25. Graphs of the system states (10) with disturbance $\xi(t) = \sin(1000t)$ upon applying the control law (11) with exponents $\gamma_0 = 1/10$, $\gamma_1 = 1/10$, $\gamma_2 = 1/5$ and initial conditions $x_{10} = 1000$, $x_{20} = 1000$

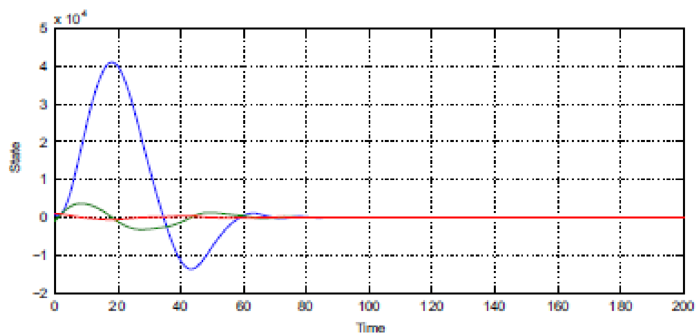

Fig. 10. Graphs of the system states (10) upon applying the control law (11) with initial conditions $x_{10} = 1000$, $x_{20} = -1000$.

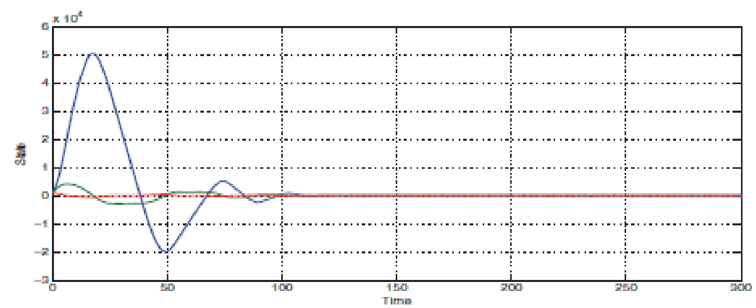

Fig. 17. Graphs of the system states (10) upon applying the control law (11) with exponents $\gamma_0 = 1/10$, $\gamma_1 = 1/10$, $\gamma_2 = 1/5$ and initial conditions $x_{10} = 1000$, $x_{20} = 1000$

Simulations

- 1. Apply constant as well as perturbations with different frequencies.

  2. Make zooms

  3. Make precision tests changing the sampling and

  showing the precisión order