

Advances in output feedback adaptive control of uncertain systems

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Outline

1. Introduction
2. Federal University of Rio de Janeiro
3. COPPE
4. GSCAR
5. Research topics
6. Paper about ...
7. Conclusion

1. Introduction

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2. Federal University of Rio de Janeiro

3. COPPE

4. GSCAR

5. Research topics

SDU factorization

- Problem: Generalization of $\text{sign}(\underbrace{K_p}_{\text{Matrix!}})$ for MIM

- Solution: factorization $K_p = S D U$

S = symmetric positive definite

D = diagonal

U = unit upper triangular

⇒ SDU factorization reduces the problem of designing

$$\text{sign}(K_p) \longrightarrow \text{sign}(D)$$

$$1 \text{ MIMO } (m \times m) \text{ MRAC} \longrightarrow m \text{ SISO MRAC}$$

Other results:

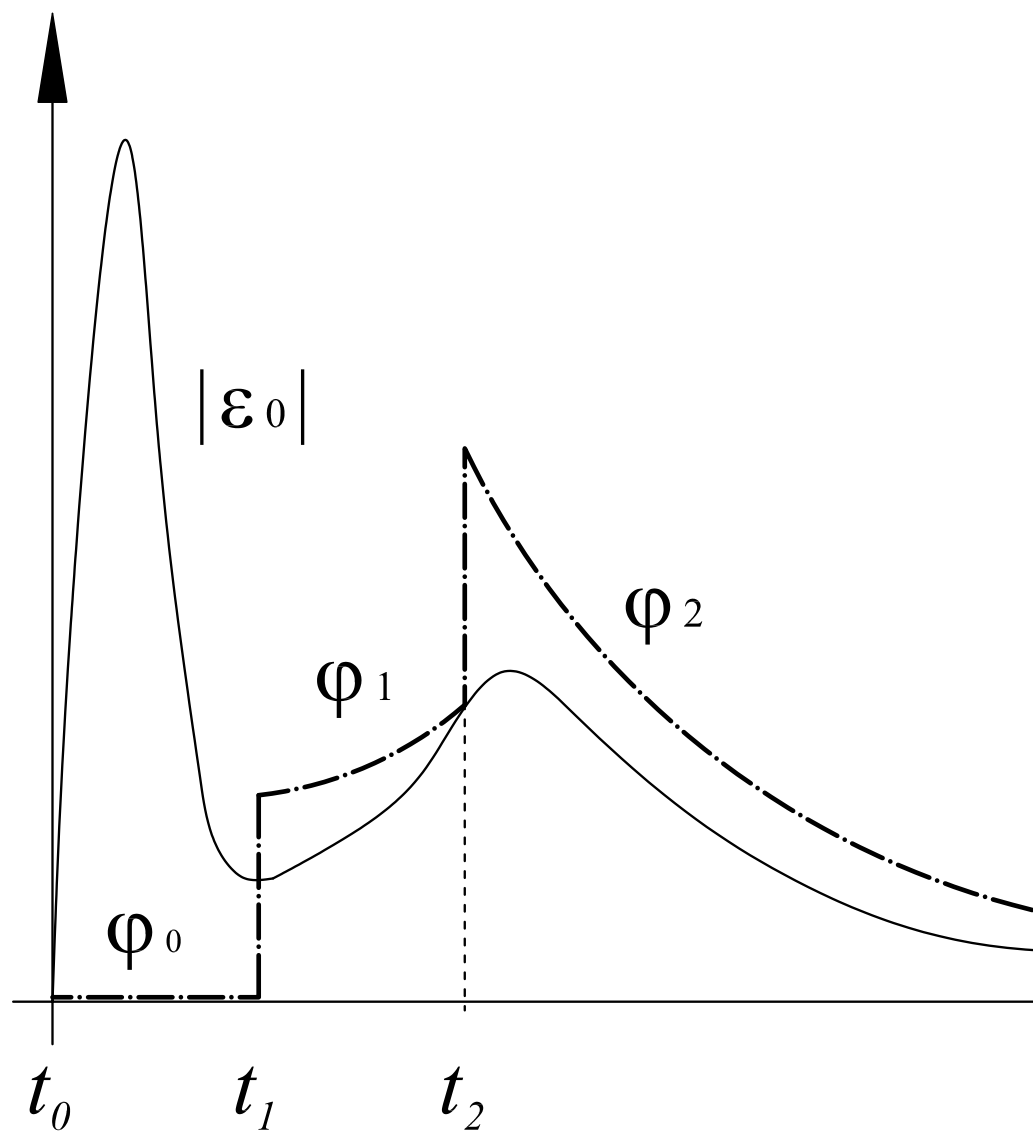
1. Improvement of the transient transient
[\[IFAC 2008\]](#)

2. Visual servoing with robot/camera uncertain dynam
[\[IFAC 2008\]](#)

Monitoring function

The problem : Given an uncertain plant with unknown dynamics, how to make the output track a given reference signal (e.g. generated by a Reference Model).

The idea : Use Sliding Mode Control and identify the control law by the use of a monitoring function σ from the stability analysis (by Lin Yan et.al.).



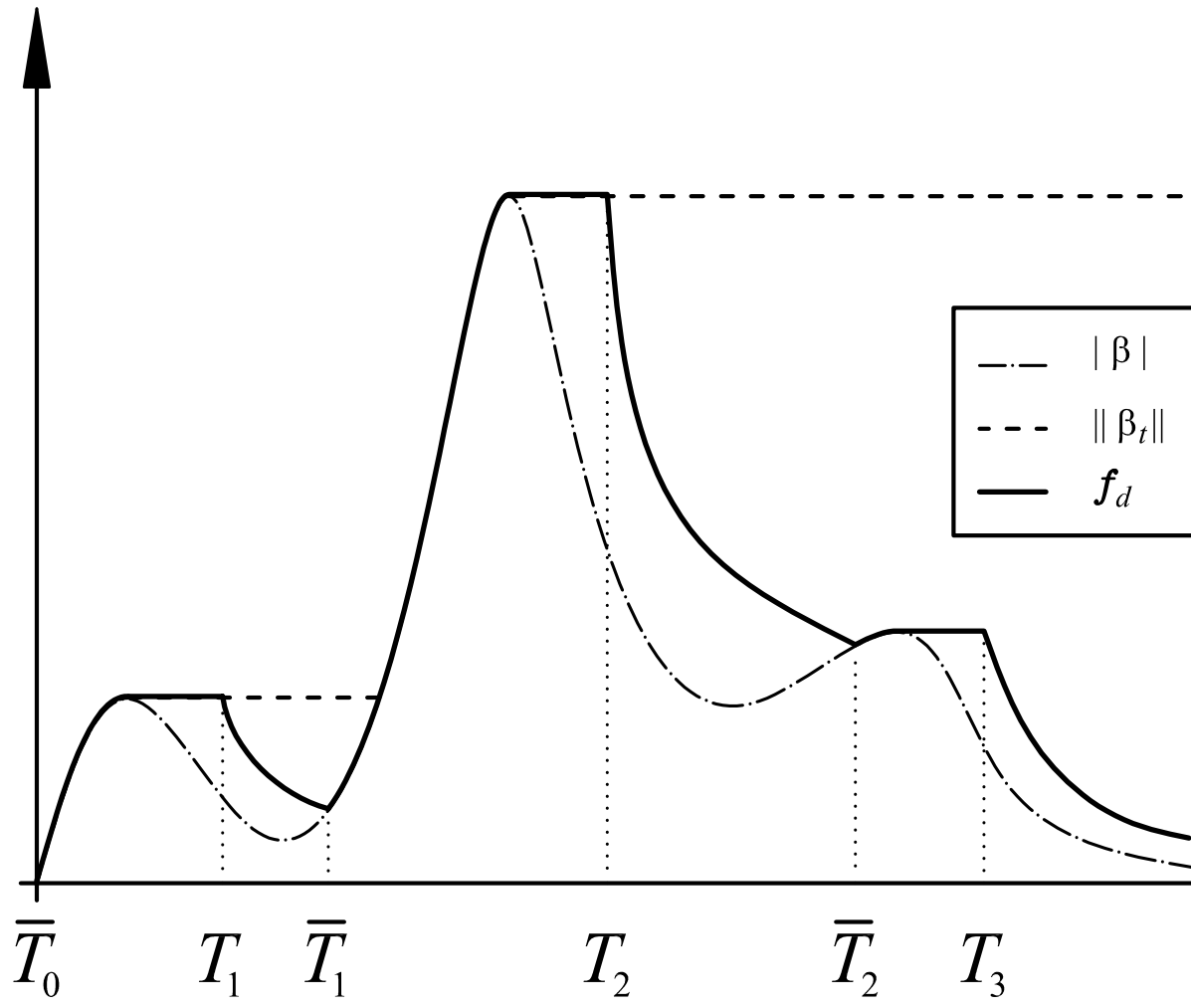


Figure 1: Functions $|\beta|$, $\|\beta_t\|_\infty$ and f_d .

Generalizations

1. The method of monitoring function was extended to arbitrary relative degree in the linear case (CDC2000) and a Kalman filter to compensate the relative degree. Experiments were shown to validate the method.
2. Extended to SISO nonlinear systems (VSS2006, IJA) and arbitrary relative degree and preliminarily extended to MIMO systems (ACC2007).

New

1. [IFAC 2008] Formation control
2. [...] Nanopositioning
3. [VSS 2008] Global exact tracking + switch lead filter

Unclassified

[VSS 2008] Artigo do Thiago. Estratégia do Drakunov

[ACC 2008] Artigo do Eduardo. ...