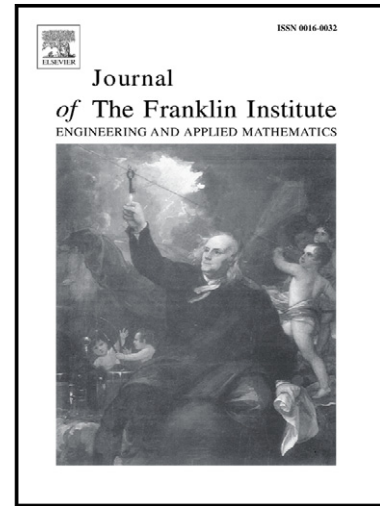


State constrained tracking control for nonlinear systems

Souad Bezzaoucha, Benoît Marx, Didier Maquin, José Ragot



[www.elsevier.com/locate/jfranklin](http://www.elsevier.com/locate/jfranklin)

PII: S0016-0032(15)00178-7  
DOI: <http://dx.doi.org/10.1016/j.jfranklin.2015.05.003>  
Reference: FI2325

To appear in: *Journal of the Franklin Institute*

Received date: 8 February 2014  
Revised date: 23 March 2015  
Accepted date: 3 May 2015

Cite this article as: Souad Bezzaoucha, Benoît Marx, Didier Maquin, José Ragot, State constrained tracking control for nonlinear systems, *Journal of the Franklin Institute*, <http://dx.doi.org/10.1016/j.jfranklin.2015.05.003>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# State constrained tracking control for nonlinear systems

Souad Bezzaoucha<sup>a</sup>, Benoît Marx<sup>b,c</sup>, Didier Maquin<sup>b,c</sup>, José Ragot<sup>b,c</sup>

<sup>a</sup>*Bordeaux Institute of Technology, INP Enseirb-Matmeca, IMS-lab, 351 cours de la libération,  
33405 Talence, France*

<sup>b</sup>*Université de Lorraine, CRAN, UMR 7039, 2 avenue de la Forêt de Haye,  
Vandœuvre-lès-Nancy Cedex, 54516, France*

<sup>c</sup>*CNRS, CRAN, UMR 7039, France*

---

## Abstract

This work addresses the model reference tracking control problem. It aims to highlight the encountered difficulties and the proposed solutions to achieve the tracking objective.

Based on a literature overview of linear and nonlinear reference tracking, the achievements and the limitations of the existing strategies are highlighted. This motivates the present work to propose clear control algorithms for perfect and approximate tracking controls of nonlinear systems described by Takagi-Sugeno models. First, perfect nonlinear tracking control is addressed and necessary structural conditions are stated. If these conditions do not hold, approximate tracking control is proposed and the choice of the reference model to be tracked as well as the choice of the criterion to be minimized are discussed with respect to the desired objectives. The case of constrained control input is also considered in order to anticipate and counteract the effect of the control saturation.

**Keywords:** Tracking control, nonlinear systems, constrained input, perfect and approximate state tracking.

---



---

*Email addresses:* souad.bezzaoucha@u-bordeaux.fr (Souad Bezzaoucha),  
benoit.marx@univ-lorraine.fr (Benoît Marx), didier.maquin@univ-lorraine.fr  
(Didier Maquin), jose.ragot@univ-lorraine.fr (José Ragot)

Download English Version:

<https://daneshyari.com/en/article/4975020>

Download Persian Version:

<https://daneshyari.com/article/4975020>

[Daneshyari.com](https://daneshyari.com)