

Accepted Manuscript

Improved algorithm for computing the domain of attraction of rational nonlinear systems

Péter Polcz, Tamás Péni, Gábor Szederkényi

PII: S0947-3580(17)30243-1
DOI: [10.1016/j.ejcon.2017.10.003](https://doi.org/10.1016/j.ejcon.2017.10.003)
Reference: EJCON 230



To appear in: *European Journal of Control*

Received date: 4 July 2017
Revised date: 13 September 2017
Accepted date: 10 October 2017

Please cite this article as: Péter Polcz, Tamás Péni, Gábor Szederkényi, Improved algorithm for computing the domain of attraction of rational nonlinear systems, *European Journal of Control* (2017), doi: [10.1016/j.ejcon.2017.10.003](https://doi.org/10.1016/j.ejcon.2017.10.003)

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 proof before it is published in its final 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.

Improved algorithm for computing the domain of attraction of rational nonlinear systems

Péter Polcz^a, Tamás Péni^b, Gábor Szederkényi^{a,b}

^a*Faculty of Information Technology and Bionics, Pázmány Péter Catholic University, Práter u. 50/a, H-1083 Budapest, Hungary*

^b*Systems and Control Laboratory, Institute for Computer Science and Control (MTA SZTAKI), Hungarian Academy of Sciences, Kende u. 13-17, H-1111 Budapest, Hungary*

Abstract

An improved method for computing **a bounded estimate of the domain of attraction (DOA) of locally asymptotically stable uncertain rational nonlinear system models is proposed in this paper.** The approach is based on the previous work of Trofino and Dezuó (2013). Using linear fractional transformation and an additional simplification step, we give a novel automatic method for generating the rational terms to be considered in the Lyapunov function, which satisfy the requirements for system representation. Moreover, we give an algorithm for computing the so-called maximal annihilators, which contain the maximum number of linearly independent rows corresponding to a given feasibility domain. As the illustrative examples show, the proposed method effectively reduces the size of the resulting optimization problem without increasing the conservatism of the DOA computation.

Keywords: nonlinear systems, uncertain systems, stability, Lyapunov functions, domain of attraction, linear matrix inequalities,

2000 MSC: 37B25

1. Introduction

Approximating the domain of attraction (DOA) is often a fundamental task in model analysis and controller design/evaluation. The stability proper-

Email addresses: polcz.peter@itk.ppke.hu (Péter Polcz),
peni.tamas@sztaki.mta.hu (Tamás Péni), szederkenyi@itk.ppke.hu (Gábor Szederkényi)

Download English Version:

<https://daneshyari.com/en/article/7113717>

Download Persian Version:

<https://daneshyari.com/article/7113717>

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