

Accepted Manuscript

Stability and resonance conditions of the non-commensurate elementary fractional transfer functions of the second kind

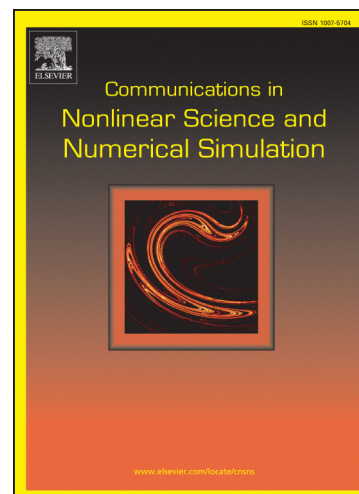
A. Ben Hmed, M. Amairi, M. Aoun

PII: S1007-5704(14)00328-1

DOI: <http://dx.doi.org/10.1016/j.cnsns.2014.07.014>

Reference: CNSNS 3280

To appear in: *Communications in Nonlinear Science and Numerical Simulation*



Please cite this article as: Ben Hmed, A., Amairi, M., Aoun, M., Stability and resonance conditions of the non-commensurate elementary fractional transfer functions of the second kind, *Communications in Nonlinear Science and Numerical Simulation* (2014), doi: <http://dx.doi.org/10.1016/j.cnsns.2014.07.014>

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.

Stability and resonance conditions of the non-commensurate elementary fractional transfer functions of the second kind

A. BEN HMED, M. AMAIRI, M. AOUN

*University of Gabes,
National Engineering School of Gabes (ENIG)
Research Unit Modeling, Analysis and Control of Systems
(MACS)06/UR/11-12,
Omar Ibn el Khattab street, 6029 Gabes, Tunisia*

Abstract

This paper deals with stability and resonance conditions of the non-commensurate elementary fractional transfer function of the second kind. This transfer function is a generalization of the elementary fractional transfer function of the second kind to a arbitrary order. It is written in the canonical form and characterized by a non-commensurate order, a pseudo-damping factor and a natural frequency. Stability and resonance analysis is done in terms of the pseudo-damping factor and the non-commensurate order. Also, an overall study of frequency-domain and time-domain performances of the considered system is done. Therefore many time-domain and frequency-domain curves are presented to help obtaining system parameters for a specified fractional order. Many illustrative examples show the efficiency of this study. Also, an application to the control of a spherical tank is also presented to present the usefulness of this study.

Keywords: Fractional system, time-domain, frequency-domain, resonance, stability

1. Introduction

Recently, fractional order calculus has gained a considerable importance in various fields as physics and engineering (see [3] and references therein for more details). In fact, the dynamic behavior of many physical systems can be described by a fractional order system theory which has been used in several applications, such as viscoelasticity, diffusion, modeling, and control [2, 14]. Motivated by the need of time-domain and frequency-domain analysis

Email addresses: benhmed.amina@gmail.com (A. BEN HMED),
amairi.messaoud@ieee.org (M. AMAIRI), mohamed.aoun@enig.rnu.tn (M. AOUN)

Download English Version:

<https://daneshyari.com/en/article/7155674>

Download Persian Version:

<https://daneshyari.com/article/7155674>

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