2024 IEEE 3rd International Conference on Control, Instrumentation, Energy & Communication (CIEC) | 979-8-3503-1370-3/24/$31.00 ©2024 IEEE | DOI: 10.1109/CIEC59440.2024.10468211

2024 3rd International Conference on Control, Instrumentation, Energy & Communication (CIEC)

CONFERENCE PROCEEDINGS

ORGANIZERS

IEEE Joint CSS-IMS Kolkata Chapter

SPONSORS

ISBN: 979-8-3503-1370-3
PART NUMBER: CFP2497V-ART

2024 IEEE 3rd International Conference on Control, Instrumentation, Energy & Communication (CIEC) | 979-8-3503-1370-3/24/$31.00 ©2024 IEEE | DOI: 10.1109/CIEC59440.2024.10468184

Table of Contents

Investigating the Effectiveness of Optimization with Modified Stability Boundary Locus Fitting for Approximation of α-order Fractional Filters

Publisher: IEEE

Shibendu Mahata ; Ritu Rani De Maity **All Authors**

Abstract:
This paper presents a new approach for the rational approximation of fractional-order lowpass and highpass filters of order α, where $\alpha \in (0, 1)$. The propos... **View more**

Metadata

Abstract:
This paper presents a new approach for the rational approximation of fractional-order lowpass and highpass filters of order α, where $\alpha \in (0, 1)$. The proposed approach considers the modified stability boundary locus (M-SBL) based filter approximants as an initial point for a classical optimizer to determine the model coefficients. The performance of the M-SBL fitting for the fractional-order filter approximation is compared with the proposed method to justify the effectiveness of the suggested scheme regarding both the magnitude and phase characteristics. The distinct advantage of the proposed approach is to avoid the incorporation of stability and minimum-phase constraints, thus reducing the computational burden. Comparisons with the published literature demonstrate the overall improved frequency-domain fitting performance for the proposed approximants.

Published in: 2024 IEEE 3rd International Conference on Control, Instrumentation, Energy & Communication (CIEC)

Date of Conference: 25-27 January 2024

DOI: 10.1109/CIEC59440.2024.10468144

Date Added to IEEE *Xplore*: 20 March 2024

Publisher: IEEE

ISBN Information:

Conference Location: Kolkata, India

Electronic ISBN:979-8-3503-1370-3
Print on Demand(PoD) ISBN:979-8-3503-1371-0

Shibendu Mahata
Dept. of Electrical Engineering, Dr. B. C. Roy Engineering College, Durgapur, India

Ritu Rani De Maity
Dept. of Electrical Engineering, Dr. B. C. Roy Engineering College, Durgapur, India

Contents

Fractional calculus provides a generalist theory and viewpoint of the classical calculus [1]. The advantage gained from such generalization helps to achieve mathematical models that can better capture the real-world systems dynamics when compared against the traditional approach involving ordinary Newtonian differential equations. Applications of fractional calculus are reported in diverse disciplines, such as circuit theory [2], dynamical control systems [3], machine learning [4], image processing [5], fault diagnosis [6], etc.

Shibendu Mahata
Dept. of Electrical Engineering, Dr. B. C. Roy Engineering College, Durgapur, India

Ritu Rani De Maity
Dept. of Electrical Engineering, Dr. B. C. Roy Engineering College, Durgapur, India