

MASTER

System Identification and Control Design for Compensation of Machine Frame Dynamics

Popescu, Matei-George

Award date:
2022

[Link to publication](#)

Disclaimer

This document contains a student thesis (bachelor's or master's), as authored by a student at Eindhoven University of Technology. Student theses are made available in the TU/e repository upon obtaining the required degree. The grade received is not published on the document as presented in the repository. The required complexity or quality of research of student theses may vary by program, and the required minimum study period may vary in duration.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



Department of Electrical Engineering
Control Systems Group
Systems and Control Program

ASMPT enabling the
digital world

Center of Competency

System Identification and Control Design for Compensation of Machine Frame Dynamics

*MSc Graduation Project (45 ECTS credits)
Publicly available as with October 2024*

M.G. Popescu
ID 1555804

Graduation Committee Members

Committee chair:	prof. dr. ir. Paul van den Hof
TU/e supervisors:	dr. ir. Roland Tóth dr. ir. Maarten Schoukens
ASMPT supervisor:	ir. Stijn Beer
External member:	prof. dr. ir. Marcel Heertjes

External Supervisors

ASMPT supervisors:	dr. ir. Dragan Kostić ir. Kai Wa Yan Kelvin
--------------------	--

Eindhoven, October 2022

Declaration concerning the TU/e Code of Scientific Conduct for the Master's thesis

I have read the TU/e Code of Scientific Conduct¹.

I hereby declare that my Master's thesis has been carried out in accordance with the rules of the TU/e Code of Scientific Conduct

Date

03-10-2022

Name

Matei-George Popescu

ID-number

1555804

Signature



Submit the signed declaration to the student administration of your department.

¹ See: <https://www.tue.nl/en/our-university/about-the-university/organization/integrity/scientific-integrity/>

The Netherlands Code of Conduct for Scientific Integrity, endorsed by 6 umbrella organizations, including the VSNU, can be found here also. More information about scientific integrity is published on the websites of TU/e and VSNU

Public summary

Matei-George Popescu
m.g.popescu@student.tue.nl

Latest developments in mechatronic systems have pushed the ever-increasing performance requirements to a superior horizon. Motion control is an important element that could swiftly tackle the technological requirements, mainly centered around the throughput improvement. Lightweight machine-specific dynamics adds complexity to the identification methods and subsequent control strategies. In this paper, a data-driven identification method for LTI systems, with slightly damped machine frame dynamics, is proposed. Thereafter, an inverse-based feedforward strategy is suggested to provide the sufficient level of post-actuation, able to compensate for the settling performance limiting effects. The designed control laws are applied to both simulation and experimental setups and compared with the existing baseline feedforward controllers. A physical wirebonder is used as an experimental test bed to validate the framework, which highlights the advantage of the proposed methodology.