TENSOR PRODUCT MODEL TRANSFORMATION-BASED ADAPTIVE CONTROL TECHNIQUES WITH MECHATRONICS APPLICATIONS

Goal of the project

The main goal of this project was the analysis, the development and the validation of the control algorithms, which combines new tensor product model transformation -based design techniques, fuzzy control and adaptive control. The exploitation and dissemination of results in the refereed journals and in refereed academic conferences.

Short description of the project

Derivation of LPV models of mechatronics applications using TP-based model transformation. Mixed TP-based and adaptive control algorithms are designed for the control of laboratory equipment.

Implementation period

21.11.2017 – 31.12.2018

Budget

46.500 RON (10000 EUR)

Main activities

1. The analysis, development and implementation of new Tensor Product model transformation-based design techniques.
2. The development of mixed control algorithms by the combination of new Tensor Product based model transformation fuzzy control and gain scheduling control. The stability analysis of the closed-loop control systems.
3. The exploitation and dissemination of results, the publication of papers in high impact leading journals. The participation and presentation of papers to important conferences. The continuous development of international partnerships.
4. The management of activities.

Results

The main results of the project were:

- Bojan-Dragoş et al., Gain-Scheduling Control Solutions for Magnetic Levitation Systems, APH
- Hedrea et al., TP-Based Model Transformation Technique Applied to Modeling Vertical Three Tank Systems, SACI2018
- Bojan-Dragos et al., Control Solutions for Vertical Three-Tank Systems, SACI2018
- Szedlak-Stinean et al., Feedback Control Solutions for an Electromechanical Process with Rigid Body Dynamics, SACI2018
- Szedlak-Stînean et al., Gain-Scheduling Control Solutions for a Strip Winding System with Variable Moment of Inertia, PID2018
- Hedrea et al., Comparative Study of Control Structures for Maglev Systems, PEMC2018
- Hedrea et al., Cascade Control Solutions for Maglev Systems, ICSTCC2018
- Bojan-Dragoş et al., Gain-Scheduling Position Control Approaches for Electromagnetic Actuated Clutch Systems, ICINCO2018.

Applicability and transferability of the results:

New TP fuzzy techniques can lead to automatic tools for controller design and tuning in several control system structures. All mechatronics applications tackled in the project are interdisciplinary and multidisciplinary themselves. The new TP fuzzy techniques proposed in this project are dedicated to process control in many industry areas which are managed by the team partners.

Research team

Claudia-Adina BOJAN-DRAGOŞ, Project Director
Mircea-Bogdan RĂDAC, Member
Alexandra-Iulia SZEDLAK-STÎNEAN, Member

Contact information

Assist. Prof. Claudia-Adina BOJAN-DRAGOŞ, PhD
Faculty of Automation and Computing
Department of Automation and Applied Informatics
Address: Blvd. V. Pârvan, No. 2, 300223, Timişoara
Phone: (+40) 256 403 240
Mobile: (+40) 738 283 682
E-mail: claudia.dragos@upt.ro