NONLINEAR OBSERVERS-BASED CONTROL STRUCTURES APPLIED TO MECHATRONICS SYSTEMS

Goal of the project

The main objective of this project is to develop the necessary tools, modern control solutions and theoretical framework for later multi-purpose applications related to mechatronics systems.
The following objectives are defined:
O1. Analysis, design and implementation of modern control solutions.
O2. The validation of the proposed modeling and control approaches using simulations and experiments.
O3. The dissemination of results.
O4. Solving the project management issues.

Short description of the project

It is focused on the analysis, synthesis, modeling and development of modern control solutions.

Project implemented by

The construction of nonlinear observers still provides an open research field, efforts being made to broaden and adapt the proposed techniques in order to widen the classes of nonlinear systems to which they may apply.

Implementation period

10/10/2018 - 09/10/2020

Main activities

The main activities are as follows:
1. The elaboration of the synthesis on the operation and modelling of the proposed approaches.
2. The development and verification through simulation and experiments of the proposed control solutions for several classes of processes including those in mechatronics applications and laboratory control systems.
3. The development of Matlab / Simulink programs to test the proposed nonlinear observers.
4. The elaboration of comparative analyses to prove the validity of the approaches.

The potential impact to the scientific field may be significant because through new concepts and employed approaches, a new way for the use of highly advanced control designs in mechatronics applications is open.

Results

The targeted deliverables of this project are: 1 journal paper (e.g. IEEE Transactions on Industrial Informatics, IEE Transactions on Control Systems Technology, IET Control Theory & Applications, International Journal of General Systems, International Journal of Computers, Communications & Control, Acta Polytechnica Hungarica) and 3 conference papers published in the volumes of visible international conferences.
It is possible that more publications in this area of research will follow after the project has ended but it is very risky, due to the fact that the whole cycle of research - validation - writing manuscript - submission -revisions - acceptance lasts for at least 2 years for high quality publications.

Applicability and transferability of the results

The potential impact of the project in the scientific, social, economic or cultural environment is straightforward since the investigated topics can lead to automated tools for controller design and tuning. Although there is a wide range of possibilities for creating new themes for state-of-the-art research, noteworthy is also the impact in the socio-economic environment with directly applicative directions. In the project all mechatronics applications are focused on those applicable cost-effective training systems in the fields of robotics, automation and process control.

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