Modeling of distributed parameter systems : The port-Hamiltonian approach

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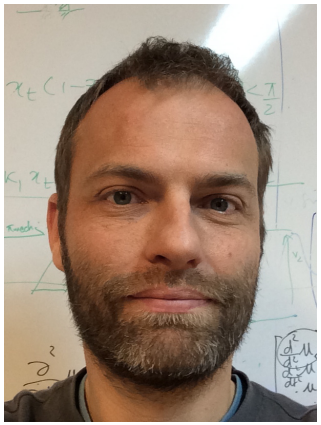
Foreword

1. Lecturers
2. Schedule of the course
3. Material/Examination
4. Objectives

Lecturers



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Schedule of the course

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Schedule of the course

Monday:

- 14:00 - 14:30 : Welcome-Practical Informations
- 14:30 - 16:00 : Introduction - Port Hamiltonian Systems (PHS) Modeling
- Break
- 16:30 - 18:00 : Tutorial (1)

Tuesday:

- 9:00 - 10:30 : State space, solutions
- Break
- 11:00 - 12:30 : Tutorial (2)
- Lunch
- 14:30 - 16:00 : Input/output
- 16:30 - 18:00 : Tutorial (3)

Wednesday:

- 9:00 - 10:30 : Transfer functions
- Break
- 11:00 - 12:30 : Tutorial (4)
- Lunch
- 14:30 - 16:00 : Stability analysis
- Break
- 16:30 - 18:00 : Tutorial (5)

Schedule of the course

Thursday:

- 9:00 - 10:30 : Control design
- Break
- 11:00 - 12:30 : Tutorial (6)
- Lunch
- 14:30 - 16:00 : Control/observer design
- 16:30 - 18:00 : Tutorial (7)

Material/Examination

- Course Material
  - Pdf version of the slides
  - Tutorials

  Available on: http://events.femto-st.fr/MCDPS-PHS/en
- References (cf slides)
- Books
  - PHS
    - A. v.d. Schaft and D. Jeltsema (2014). Port-Hamiltonian Systems Theory: An Introductory Overview. Foundations and Trends in Systems and Control, vol. 1, no. 2-3, pp. 173-378 (http://www.math.rug.nl/arjan/DownloadVarious/PHbook.pdf).
    - V. Duindam, A. Macchelli, S. Stramigioli, H. Bruyninckx (2009). Modelling and control of complex systems. The port-Hamiltonian approach, Springer.
  - DPS
    - J. A. Villegas (2007). A port-Hamiltonian Approach to Distributed Parameter Systems. PhD thesis, Universiteit Twente (https://ris.utwente.nl/ws/portalfiles/portal/6041262)
    - B. Jacob and H.J. Zwart (2012). Linear Port Hamiltonian Systems on Infinite-dimensional Spaces, Birkhäuser Basel.
    - Y. Le Gorrec, A. Ran and H.J. Zwart (2017). Control of distributed parameter systems. Lecture notes.

Objectives

This course is an introduction to modeling and control of distributed parameter systems by using the Port Hamiltonian framework. More precisely the objectives are :

- to provide some basic background on physically based modeling.
- to illustrate these modeling concepts on some well known physical examples.
- to provide some basic background on analysis and stabilization of distributed parameter systems.
- to provide an overview of power/energy based control techniques and their use for practical controller derivations.

Questions ?