Announcement for Research project

Design of a Hardware-in-the-Loop Setup for the Control of an LOHC Dehydrogenation Reactor

Motivation

In times of climate change, a transition to renewable energies is taking place. One promising energy carrier in this context is hydrogen. To avoid its disadvantages in store and transportation, Liquid Organic Hydrogen Carrier (LOHC) technology is under constant development. In this process, the hydrogen is chemically bound into the LOHC (hydrogenation) and dissolved out again before further use (dehydrogenation).

The control of such applications is based on advanced control methods. Prior tests are essential for the safe initial operation of these control methods. The hardware-in-the-loop approach is a commonly used method for this.

Quelle: https://hi-ern.de/hi-ern/h2Storage

Task description

This project aims to set up and test a hardware-in-the-loop setup for controlling an LOHC dehydrogenation reactor. For this purpose, a simplified model predictive control will be designed based on a given model and implemented on a dSpace MicroLabBox. To test the control system, a digital twin is simulated on compatible hardware and communication with the control system is established using a suitable protocol. Finally, the implementation will be critically evaluated and possible improvements will be identified.

Requirements

- Knowledge of control engineering especially model predictive control
- Experiences in MATLAB / Simulink
- Knowledge of network protocols is an advantage.

Note that the thesis can be written in either English or German.

Contact

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