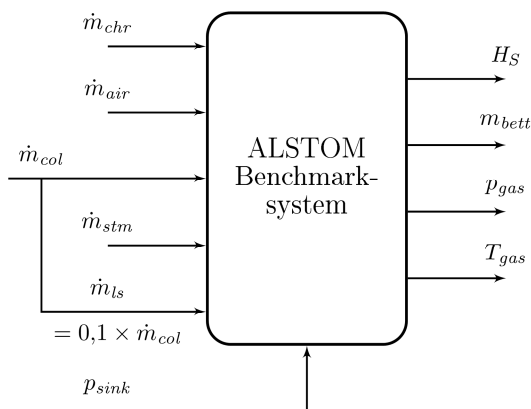


Berufspraktische Studien (BPS)

Generation and evaluation of simulation data in closed loop on the ALSTOM gasifier benchmark problem I

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Benchmark problems are intended to test and compare methods with results of third parties. A variety of benchmark problems is available in the literature and for some of them MATLAB code is provided in Internet. This work will be performed on a system which was proposed as a benchmark challenge and whose models and simulation files are available and will be provided within this student project.



Two main goals are foreseen within this work. First, simulation data on a model of the ALSTOM benchmark challenge will be generated. The model will be configured in closed loop and external excitation signals will be designed and entered into the model to generate simulation data. Second, a search method to locate informative intervals for system identification will be tested on the simulation data generated in the simulation stage. The selected plant was reported in the ALSTOM benchmark challenge I which proposed linearized models of a gasifier used in an complex energy generation system. The gasifier operates as a reactor where coal is gasified with steam and air. It is a multiple input, multiple output (MIMO) non-linear system with 5 inputs and 4

outputs. Three linearized models were presented as part of the benchmark challenge I and tests will be performed on one of them. Moreover, controllers have been proposed and tested on the provided model to fulfill performance requirements. Within this work, one of the designed controllers will be used with the gasifier model to configure a feedback system where simulations will be performed.

The tasks to be performed are:

- Familiarize with the ALSTOM benchmark problem and with the files available to carry out simulations
- Investigate and propose external excitation signals to be used for simulation in the ALSTOM gasifier. These signals may recreate real operating conditions e.g. long stationary periods with seldom transient changes
- Generate simulation data on an ALSTOM gasifier model under closed loop operating conditions
- Run simulations with search methods to identify informative intervals for system identification within the data records generated in closed loop
- Evaluate efficiency and effectiveness of search methods
- Technical documentation and presentation of results

Hint: knowledge on MATLAB and programming skills are an advantage for carrying out the above mentioned tasks but can also be gathered on the assignment.

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