

# Master's Thesis

## Modelling and control of photovoltaic and energy storage systems for hardware-in-the-loop test

### Initial situation and motivation

The volatile feed-in of photovoltaic systems can be better adapted to load curves or grid requirements by integrating energy storage devices. These are connected to the grid via converters, i.e. power electronic components. On the technical side, these pose new challenges to the stable operation of the power system, which is mainly due to the relatively complex control structure of these components. The correct modeling of photovoltaic and energy storage systems is therefore of great importance for the investigation of the stability of such systems based on hardware-in-the-loop test.

### Research question(s)

In this thesis, a detailed model of photovoltaic and energy storage systems shall be investigated. For this purpose, a comparison with a simpler modeling is to be carried out, which is to be integrated into an existing hardware-in-the-loop test system at the institute and then measured technically.

### Procedure/Methodology/Task definition

The modeling is done in Matlab/Simulink, real-time simulations are performed on a dSpace platform. The simulation results are compared and the models adapted iteratively.

### Organizational matters

#### Begin immediately.

Upon successful completion, the payment of a bonus is planned.

### Contact person / supervisor

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