

## Master-Thesis

### Faster verification of MVDC control & protection with AI

**Context:**

Medium-voltage direct current (MVDC) grids are a promising solution for distribution grids with flexible sources and loads, such as solar plants, or electric vehicle chargers. These sources and loads are connected to the MVDC grids with power electronic converters. The behavior of these converters is determined by their control and protection software. Before put in the field, this software has to pass several scenarios in computer simulation (short circuits, different load flows, grid re-configuration...). That verification process can take a long time given a variety of test cases and grid scenarios. The objective of this master thesis is to develop methods to reduce verification time by studying artificial intelligence (AI) methods.

**Student tasks:**

- Literature review on MVDC control and protection
- Familiarize with Simulink model
- Implement test cases to verify proper design of the MVDC control and protection
- Implement tool for automatic result evaluation
- Implement, test, and compare an AI-based method promising faster verification
- Analyse results

**Your profile:**

- Master student in electrical engineering
- Experience with MATLAB/Simulink
- Fundamental knowledge about power system dynamics and control theory
- Desirable but not mandatory: experience with power electronics

The thesis can be conducted either in English or German.

**Contact:**

Ilka Jahn  
Tel. +49-241-80-49618  
[ilka.jahn@eonerc.rwth-aachen.de](mailto:ilka.jahn@eonerc.rwth-aachen.de)

ACS | Institute for Automation of Complex  
Power Systems  
ERC | E.ON Energy Research Center  
RWTH Aachen University  
Mathieustr. 6, 52074 Aachen, Germany