

## **Student researcher job / Bachelor / Master thesis:**

### Runtime optimization of power grid simulations

#### **Context:**

The integration of an increasing amount of decentralized power generation and storage is a major challenge for distributed grids in the framework of the “Energiewende” in Germany. To facilitate the design of future grids, a co-simulation platform is in development at ACS in collaboration with other RWTH institutes and companies. The goal is to interconnect energy market with power grid and communication network simulations.

Therefore, currently we are looking for support regarding the optimization of power grid simulations. The models are already implemented as blocks in Modelica, an object-oriented and multi-domain modeling language. The individual components will be connected by the user to an overall network topological model and, with the aid of a Modelica translator, converted into C code. After that it will be compiled into a simulation program and executed.

#### **The aim of the work:**

Due to the size of the overall models, simulation runtimes become longer. As a first task the runtime behavior of the simulation programs shall be analyzed and the most computation and memory intensive subtasks be determined. Afterwards, there shall be numerical routines (i.e. solvers etc.) integrated which, for the given models, lead to better runtime behaviors. Furthermore, a parallelization of existing routines and the usage of parallelized numerical libraries for computer clusters and heterogeneous computers is conceivable.

#### **Professional qualifications:**

- Computer Science, Mathematics, Physics, CES, or Electrical Engineering Students
- C/C++ programming skills are mandatory
- Knowledge in Modelica and parallel programming are welcome
- Knowledge in electrical engineering are not necessary

Please send your application to Lukas Razik [lrazik@eonerc.rwth-aachen.de](mailto:lrazik@eonerc.rwth-aachen.de).

#### **Contact:**

##### **Reviewer for non-electrical engineering students:**

Prof. Dr. rer. nat. Uwe Naumann

##### **Reviewer and Supervisors:**

Prof. Antonello Monti, Ph.D.

Lukas Razik, Markus Mirz

Tel. +49-241-80-49720, 49739

[lrazik@eonerc.rwth-aachen.de](mailto:lrazik@eonerc.rwth-aachen.de)

[mmirz@eonerc.rwth-aachen.de](mailto:mmirz@eonerc.rwth-aachen.de)

STCE | Institute for  
[Software and Tools for Computational Engineering](#)  
RWTH Aachen University  
Seffenter Weg 23  
52074 Aachen, Germany

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