



# **Bachelor/Seminar Thesis**

## Differentiable Solver for Nonlinear Electrical Networks

## Motivation

Optimization is crucial in the development of devices. To facilitate the usage of efficient optimization strategies, the derivatives of the objective function need to be computed. Automatic Differentiation (AD) is a tool which can be employed at the model development stage to ensure that the model is inherently differentiable. Therefore, prerequisites are needed to easily interface to optimization routines.

# **Research Questions**

The goal of this bachelor thesis is to extend the already existing differentiable solver for electrical networks in order to also consider nonlinear network elements. Meaning that the implementation of differentiation by employing automatic differentiation libraries done in *julia* should be extended and tested for nonlinear networks. This work also has potential to be extended to a seminar and/or master thesis.

#### Tasks

- Automatic Diff. (understanding concepts, experimenting on simple examples)
- Electrical network solver (theory, developing a system concept, implementation)
- Merging with Automatic Differentiation

# Contact/Supervisor

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#### Prerequisites

- Language : German/English
- Start : As soon as possible
- Programming skills : Intermediate
- Study : ET, ICE, ET-Toningenieur, DE

