Master's Thesis Electrical Engineering at Energy Lab 2.0

Development of an Active Distribution Network Benchmark Including Variable Load Sensitivity and Load Composition

Thesis Description:

Electrical power grids are evolving from centralized generation with unidirectional power flows to distributed operation with bi-directional flows. Many active distribution networks are already available to study demand side management, ancillary services, or electrical vehicles integration. However, the load parameters used in these models are constant and are not updated over time, even though the load composition is constantly changing. The load parameters are required by some future control methods, such as voltage-based power control. Control tests for aggregated levels can not be performed without an accurate distribution network model that accounts for the variability of load parameters.

The objective of this thesis is to create an active distribution network including the load sensitivity values. The model should access the load sensitivity from a database that is regularly updated.

Milestones:

- Active distribution network:
  - Study the existing benchmarks and compare their use in different research areas
- Dynamic model:
  - Implement a distribution network with active and passive loads
  - Allow load composition to be dynamically updated, e.g. using likelihood for each scale house/load type/operation time
- Load sensitivity database:
  - Integrate the load sensitivity into the benchmark
  - Perform a power flow analysis and validate the model

Your Profile:

- Experience with Matlab/Simulink
- (+) Experience with Simscape
- Language: German or English

Contact:
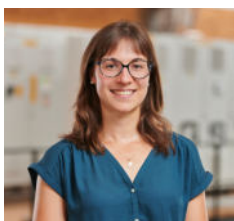
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