Institut für Automatisierungstechnik

Master Project/Thesis

Development of a computational grid operation simulation tool for grid operation to optimize voltage stability

Introduction: Future power supply is depending on renewable energy sources (RES), which are distributed in different areas in the network with a growing up dominance in distribution grids. With the current network operation scenario, DSOs (Distribution System Operators) do not have the responsibility of observing the voltage and frequency stability instantaneously. However, TSOs (Transmission System Operators) have to distribute grid control to DSOs in the future to control the voltage and frequency in a smaller responsibility area.

The voltage and frequency control at the DSOs level with many distribution resources lead to a research question of how the control concept can be defined and how the voltage and frequency stability can be improved. Therefor, developing a computational simulation tool to assist the operation of the grid to improve the voltage and frequency stability of the grid could be a solution.

For this purpose, it is desired to develop a computational tool that can optimize voltage and frequency for the grid operation, which is a critical task to be observed and carried out during operation. Developing an optimization tool assist the grid operator to operate the network while the voltage and frequency limits violations are minimized.

Tasks: Within this project, it is desired to build a computational tool to improve the voltage stability in a dynamic environment. The highlights of this project are:

- Literature review on voltage improvement techniques and optimization methods
- Building the optimization model
- Using Matlab/Simulink/Python to develop the tool
- Validating the tool on a standard grid and a study case grid
- *Define the control concept (centralized/decentralized)
- *Developing a decision making concept based on the control concept
- *Network requirements

Requirements:

- Electrical power engineering background
- Interest in power managements/system/optimization
- Interest in mathematical formulation and solution
- Knowledge of power system generation, distribution and transmission
- Basic knowledge of power system simulation software

* If the topic is registered or extended as master thesis

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