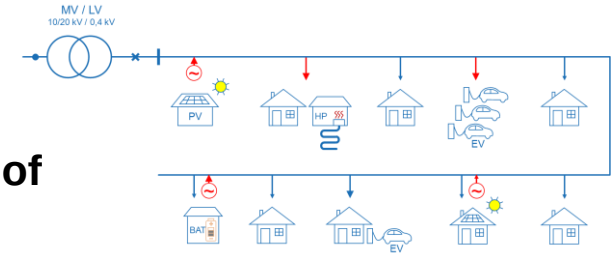
2025-03-18

Institute of Electrical Power Systems

Master Thesis

Implementation and evaluation of different algorithms for the reconfiguration of low-voltage grids



Motivation

Ongoing developments in high-power consumers (e.g. electric vehicle charging stations, heat pumps or air conditioning systems) on the one hand and renewable energy generators (e.g. photovoltaic systems, CHP) combined with prosumers (e.g. battery storage, energy and load control) on the other are presenting existing low-voltage distribution grids with new challenges. These include, for example, the management of an efficient and effective load flow or in the event of a fault.

One possible mitigation measure can be the reconfiguration of the grid topology - e.g. in the form of separation point relocation or (temporary) meshing.

Research Topics

- Which methods, concepts and algorithms for (automatic) reconfiguration, separation point relocation and meshing at the low-voltage level are currently used in practice or are state of the research? (Advantages, disadvantages, preconditions, applicability, etc.)
- Can the researched methods, concepts and algorithms be used or implemented in different grids - regardless of their voltage level (low, medium or high voltage)?
- What advantages, disadvantages or obstacles are to be expected in their practical implementation?
- How can such algorithms be implemented in simulation environments (e.g. DIgSILENT PowerFactory, Python pandapower) and compared with each other?

Procedure/Methodology/Task definition

- Literature research on the relevant research questions, including summarising and preparing the investigated methods, concepts and algorithms;
- Evaluation of their applicability in relation to the research questions mentioned;
- Implementation of the researched methods, concepts and algorithms in existing example grid models (e.g. MATLAB, DIgSILENT Power Factory, Python pandapower);
- Presentation of the results and findings in the course of the Master's seminar project [432.009 (ET) or 432.010 (ET Wirtschaft)] and documentation in the form of the Master's thesis;

Begin immediately

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