

Master Thesis/ Internship

Date: 17.05.2024, Aarau

Developing a probabilistic security assessment tool to validate the long-term planned outages

Introduction

Deterministic power system security assessment (SSA) has demonstrated limitations in operational planning, particularly with the increasing integration of volatile renewable-based power generation. Point-forecast-based SSA alone is insufficient due to inherent uncertainties in the power system. These uncertainties arise from weather data, market dynamics, load and generation profiles, and the availability of system elements. To enhance decision-making processes, especially when planning element outages, a paradigm shift from deterministic to probabilistic security assessment is essential.

In this thesis, we propose the development of a probabilistic SSA tool—an awareness tool—to provide operational planners with comprehensive information about network conditions and associated security risks.

Tasks

- Creating a probability model out of historical load and generation measurements
- Generation of probabilistic samples based on an existing probability model.
- Including the probability of tripping elements into the security assessment process.
- Building a power flow for probabilistic security assessment based on full AC power flow models.
- Improvement of the tool performance by introducing linearized power flow model.
- Representation of the results and the corresponding risks.

Requirements

- Programming language skills like python, MATLAB, etc.
- Strong power system analysis knowledge including power flow and contingency analyses
- Familiarity with power flow tool such as PSSE, PowerFactory, Pandapower, etc.
- Strong Communication and writing skills in English (German or French is an advantage)
- Self-reliance on solving the challenges and debugging the programming code

Duration

6 months with a possibility of having a 6-month internship in advance.

Location

Aarau

Contact Person

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