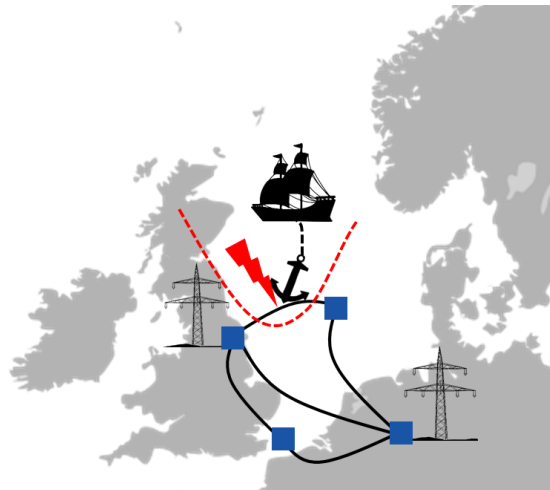


Master-Thesis

Sensitivity Analysis of Hardware and Software Parameters in HVDC Protection

Context:

High-voltage direct-current systems using modular multilevel converters (MMCs) are expected to be the dominant technology for the integration of renewable offshore wind energy into the power system. In case of a short circuit (e.g., a ship anchor on a submarine cable), the faulty part of the HVDC system has to be disconnected, for example using DC circuit breakers. This protection system (that is, its software and hardware) has to match the converter software and hardware, as well as, surrounding grid hardware. However, there are complex interdependencies. In this master thesis, a sensitivity analysis shall reveal which parameters have the most impact on an HVDC protection system. As a result, the protection design process can be simplified by fixing certain parameters at the beginning and leaving others flexible for later re-tuning.



Student tasks:

- Literature review on HVDC protection and sensitivity analysis
- Implementation and testing of MMC protection system in existing Simulink model
- Sensitivity analysis of hardware and software parameters relevant in HVDC protection
- Assessment of parameter sensitivity resulting in guidelines for design process

Your profile:

- Master student in electrical engineering
- Experience with MATLAB/Simulink
- Fundamental knowledge about power system dynamics and control theory
- Desirable but not mandatory: experience with power electronics and/or protection

The thesis can be conducted either in English or German.

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