Modeling of the electrical field distribution in HVDC cable joints

Master thesis / Bachelor thesis

High voltage direct current (HVDC) energy transmission systems being implemented in Germany in the context of the national grid extension program are partly realized as XLPE-insulated cables, which raises the need for solid insulation systems operating reliably under DC stress.

Notably material interfaces, e.g. in cable accessories, differ fundamentally under DC electrical stress compared to AC voltage with regard to their electrical behaviour. The electrical field distribution depends significantly on the various materials’ electrical conductivity in case of DC operation, which is in turn sensitive to changes in temperature as well as local electrical field strength. Furthermore, the conductivity changes during service life due to ageing of the insulation materials.

The scope of this thesis is the implementation of a simulation model allowing for the calculation of the electrical field distribution in HVDC cable accessories for different material combinations and loading as well as ageing conditions of the cable system operating under DC and superimposed transient voltages.

Goals and focus of the thesis

- Implementation of a simulation model calculating the electrical field distribution in HVDC cable joints
- Parameter variations and sensitivity studies

Your profile

- Study in Electrical Engineering or Industrial Engineering and Management
- Interest in technical and physical phenomena
- Previous experience FEM simulation is advantageous

Contact

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Focus

- FEM simulation
- Insulation systems
- HVDC cable technology