2025-03-04

Institute of Electrical Power Systems

Master Thesis

Voltage factor *c* for short-circuit calculations in the U_n > 400 kV range

Background and Motivation

When using the equivalent voltage source method at the fault location, it is necessary to use a source voltage that corresponds to the voltage at the fault location before the short circuit occurs. This requires a load flow calculation so that this voltage can then be used as a voltage source. The problem is that extensive calculations must first be carried out for each short-circuit case, which is not acceptable in practice. The solution to this problem in the standard is the introduction of a voltage factor c, which replaces this calculation with sufficient accuracy.
As the voltage factor is currently only defined for nominal system voltages up to 400 kV, this thesis examines the extent to which an extension for higher voltages (500 kV...1100 kV) could be implemented.

Research Questions

- According to which criteria is the voltage factor *c* currently defined?
- How can these criteria be extended for nominal voltages > 400 kV?
- Which models can be used to verify a voltage factor for the highest grid voltages?

Procedure/methodology/tasks

- Research the methodology for determining the voltage factor
- Carry out grid calculations to determine a factor for grids with higher nominal voltages
- Development of a proposal for incorporation into the IEC 60909-0 standard

Organisational details

- Begin immedaiately

Contact person/supervisor

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