

Master thesis

Network modelling to investigate the influence of unbalances in network impedance calculations

In the context of the energy transition, converter-based systems are becoming increasingly widespread in low-voltage grids. Their behaviour can significantly influence the voltage quality and is the focus of research in order to be able to guarantee grid stability and supply quality even with further expansion of renewable technologies.

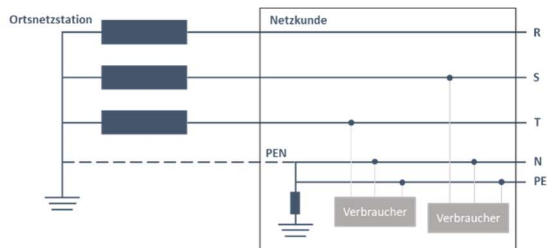


Figure 1: Unbalanced TN-C-S low-voltage grid

The grid impedance is a helpful indicator for recognising potential risks and taking countermeasures at an early stage. Classically, these calculations are carried out under the assumption of ideally symmetrical grid elements. In low voltage, however, a considerable number of network elements are connected in single phase, lines show asymmetries and the earthing

system can also have an influence. It is therefore necessary to investigate to what extent these conditions must be taken into account in the grid impedance calculation in order to be able to analyse current and future developments and challenges with high accuracy.

In this work, an existing tool for grid impedance calculation is therefore to be extended and the influence of the above aspects is to be examined.

Core tasks and objective

- Research regarding network impedance calculation and low-voltage network structure
- Extension of an existing tool for modelling relevant effects of unbalance
- Plausibility check of the adjustments by means of synthetic low-voltage grids
- Comparison between balanced and unbalanced calculation methods

Your profile

- Degree in computer science or engineering (electrical engineering, computer science, mechanical engineering, power system engineering).
- Knowledge of C++ and/or Python is advantageous

Contact



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Focus



- Grid modelling
- Unbalances
- Grid impedance calculation