Operation-Oriented Series and Main Inductance Design of Medium-Frequency Transformers for galvanically isolated dc-dc Converters

Future electric grids with dc-technology provide higher flexibility and efficiency for decentralized energy systems compared to conventional ac-technology. In this work, you design the series and main inductance of a three-phase medium-frequency transformer (MFT) for a typical operation range profile of renewable energy sources. The operation-range profile comprises the various scenarios of power production and dc-link voltage deviations of the dc-dc converter.

You analyze the influence of the series and main inductance of a MFT on the operation of a galvanically isolated dc-dc converter. The leakage inductance of the MFT with an optional series inductor provide the required series inductance of the dc-dc converter and the magnetic core forms the main inductance.

Hence, you identify the optimized inductances for highest annual energy efficiency of the dc-dc converter with a representative operation-range profile of wind energy converters or photovoltaic power plants.

You simulate and verify your optimized EEC of the MFT with a converter circuit in Plecs. Your work is a continuation of a previous bachelor thesis work, so you can use available tools. You can build up required software skills within this thesis. Good luck!

This thesis is adapted for students from the following course studies:

☒ Elektrotechnik, Informationstechnik und Technische Informatik
☒ Wirtschaftsingenieurwesen (Fachrichtung: Elektrische Energietechnik)

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