Contribution ID: **308** Contribution code: **THU-PO3-719-11** Type: **Poster**

Thermal Network Modeling for High-frequency Insulated Core Transformers

Thursday 18 November 2021 10:00 (20 minutes)

Abstract: The high-frequency insulated core transformer (ICT) accelerator is expected to replace traditional ICT for its small size and high power density in the field of irradiation below 1MeV. As a key component of the accelerator, the ICT high-voltage power supply is used to feed the accelerator tube. Segmented core structure of the ICT will lead to uneven flux density distribution of each core section. The nonuniform power loss and structure results in uneven temperature distribution of the high-frequency ICT. In this regard, a thermal model with highly accurate temperature prediction on the high-frequency ICT parts is required. A thermal impedance network based on the high-frequency ICT is proposed, considering the thermal coupling of the ambient, cores and windings. The Multiphysics coupling analysis is carried out by COMSOL electromagnetic thermal module. Instead of linear materials, the measured B-P curve and B-H curve are applied for more realistic simulation model. Due to the complex ICT core structure, the parameters of the thermal model are determined by finite element simulation so that the precision of the network is improved. Finally, the thermal model demonstrates high accuracy within the simulation results, which verifies the effectiveness of the proposed model.

Key words: High-frequency insulated core transformer, Thermal network, Thermal model, Multiphysics simulation, Temperature distribution

Authors: NIE, Lanxin (State Key Laboratory of Advanced Electromagnetic Engineering and Technology (School of Electrical and Electronic Engineering, Huazhong University of Science and Technology), Wuhan, China); YANG, Jun (State Key Laboratory of Advanced Electromagnetic Engineering and Technology (School of Electrical and Electronic Engineering, Huazhong University of Science and Technology), Wuhan, China); TANG, Kun (Huazhong University of Science and Technology, China)

Presenter: NIE, Lanxin (State Key Laboratory of Advanced Electromagnetic Engineering and Technology (School of Electrical and Electronic Engineering, Huazhong University of Science and Technology), Wuhan, China)

Session Classification: THU-PO3-719 Design and Analysis II