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Gastvortrag

Finite Element Simulation of Effects at Higher Frequencies in Windings of Machines and Transformers

Prof. Dr.-Ing. Herbert De Gersem (Technische Universität Darmstadt, Germany)

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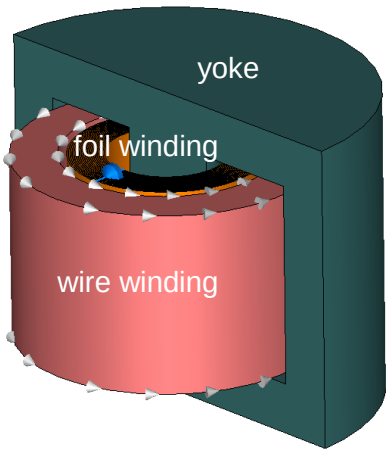
At elevated frequencies, windings exhibit more pronounced skin and proximity effects and relevant capacitive inter-turn currents. This may adversely affect the performance of a machine or transformer. An accurate simulation of such effects requires the individual winding turns to be resolved by the finite-element mesh, which leads to unnecessarily large models. In the talk, dedicated winding models are developed such that windings can be embedded as bulk parts in the overall model and such that inter-turn voltage drops and capacitive currents are considered by spatial homogenization. The method is illustrated for a foil transformer where the redistribution of the current towards the foil tips is particularly important and for a permanent magnet synchronous machine where overvoltages at the terminals occur.



Prof. Dr.-Ing. Herbert De Gersem received the MSc and PhD degrees in electrical engineering from KU Leuven, Belgium, in 1994 and 2001. From 2001 to 2006 he was at the Technische Universität Darmstadt in Germany. In 2006 he became professor at KU Leuven, Belgium. Since 2014 he has been full professor and head of the Institut für Theorie Elektromagnetischer Felder at Technische Universität Darmstadt in Germany. His research interests are finite-element electromagnetic field simulation for electrotechnical devices and particle accelerators and FDTD and FETD techniques for electromagnetic and ultrasonic wave propagation.