Universität Stuttgart
Institut für Elektrische
Energiewandlung

BA / FA / SA

Auslegung / Modellierung
Konstruk-tion
Hardware / Prüf-stand
FEM
Regelung

Model-based detection of winding short circuits in three-phase PMSMs

The reparability of products is increasingly becoming the focus of society and politics. With this in mind, electrical machines (EMs) should also be repairable and recyclable in the future.

Before an EM can be repaired, a defect in the machine must first be detected.

Winding short circuits can be caused by various factors, such as mechanical loads, thermal stresses or material defects. They are a frequent source of faults that can lead to serious damage. This study focuses on the model-based detection of winding short circuits in order to improve the operational safety and service life of machines.

Based on the existing state of the art, a model-based approach is to be developed with which deviations in the machine's behavior can be identified and potential winding short circuits can be precisely detected and localized.
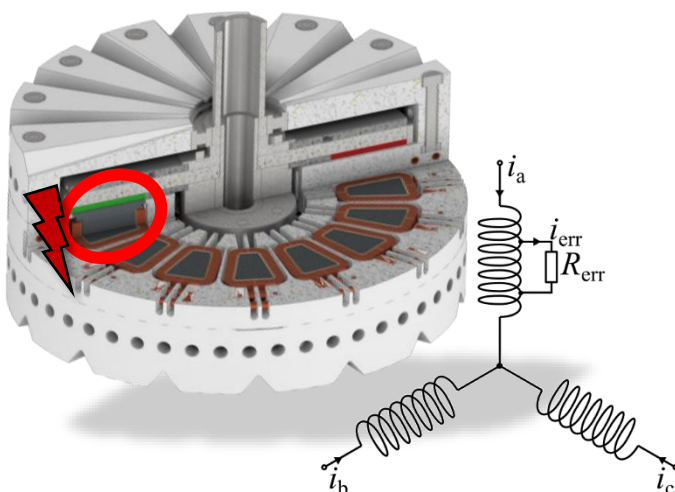
Your profile

→ Knowledge of or interest in the dq model of electrical machines

→ Good results in „Elektrische Maschinen II"

→ Knowledge of Matlab and Simulink

→ Good study performance, high level of commitment as well as structured, independent and accurate way of working

Working packages

→ Literature research

→ Development of models and algorithms based on the literature

→ Investigation of the influences on the sensitivity of the detection approaches

→ Comparison of the detection approaches

→ If necessary, further development of an approach

→ (optional) Validation on the test bench if necessary

→ Discussion of the results

Research project

This task is part of a research project within the framework of the „InnovationsCampus Mobilität der Zukunft": https://www.icm-bw.de/

Fig. 1: Cross section of an exemplary PMSM and diagram of a star circuit with an indicated winding short circuit

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