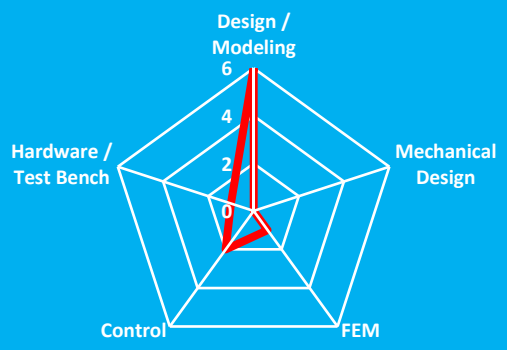
University of Stuttgart
Institute of Electrical
Energy Conversion

**Master Thesis /**

**Research Thesis**




# Investigation of the 1LCC2P Compensation Topology for the Wireless Power Transfer System of an Inductive Electrically Excited Synchronous Machine

In the inductive electrically excited synchronous machine (iEESM), the permanent magnets on the rotor of the PMSM are replaced by coils and these are supplied by a wireless power transfer (WPT) system. Compared to the slip rings classically used in the EESM, the inductive excitation system solves the wear problem and the limitation of the maximum rotor speed.

The inductive transmitter typically has a coupling factor of k = 0.6, which is why a reactive power compensation network is used to reduce losses. For use in the iEESM, a 1S2P compensation is typically applied.

As part of this student project, two different design approaches for a 1LCC2P compensation topology for use in the iEESM will be analyzed and examined through electrical simulations in Matlab/Plecs. Subsequently, a comparison with the 1S2P compensation topology will be conducted, and the compensation topologies will be evaluated.

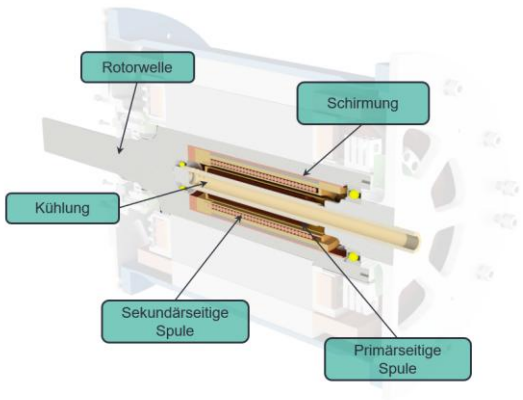



Fig.1: Structure of the WPT system in the EESM when integrated into the hollow rotor shaft

## Students profile

→ Basics of circuit technology
→ Knowledge of Matlab advantageous
→ Knowledge of Simulink/Plecs advantageous
→ Lecture Wireless Power Transfer helpful
→ You work independently and self-motivated

## Work package and schedule

→ Familiarization with the with the structure of a WPT system for the iEESM
→ Familiarization with the compensation topologies 1S2P and 1LCC2P
→ Definition of evaluation criteria
→ Development of a Matlab/Plecs Model
→ Systematic analysis of the compensation topologies
→ Comparison and evaluation of system properties

Contact: Andreas Bähr andreas.baehr@iew.uni-stuttgart.de