

University of Stuttgart Institute of Electrical Energy Conversion



Bachelor Thesis

Hardware / Test Bench

Control /

Optimization

Design /

Modeling

0 14

Con -

struction

FEM

Visualization of the Transfer Behavior of Inductive Charging Systems for EVs in the context of Uncertainties in Plant Parameterization

Inductive charging systems for EVs must be compatible with a wide range of vehicle types and performance classes. Numerous degrees of freedom in the design and operation of standardized systems lead to a variance of plant parameters, which can lead to changing transfer behavior. The knowledge of this is the basis for effective design and efficient operation.

Starting with a literature review, this thesis will first determine the fundamental harmonics behavior (FHA) of different system topologies. In the main part, these transfer functions are implemented in Matlab. The aim of this thesis is to visualize the transmission behavior under the influence of different parameter uncertainties using a Matlab GUI and compare different system topologies. Optionally, the work can be verified by Simulink/PLECS simulations at the end.



Image: X. Dai, Y. Huang and Y. Li, "Topology comparison and selection of wireless power transfer system and parameter optimization for high voltage gain," 2017 IEEE PELS Workshop on Emerging Technologies: Wireless Power Transfer (WoW), Chongqing, China, 2017, pp. 1-5.

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Students profile

- → Self-reliant and determined working attitude
- → Basic knowledge in electromagnetics
- \rightarrow Basic skills in Matlab
- → Not afraid of maths (complex analysis)
- → Interested in insight into current R&D on the standardization of automotive inductive charging

Work package and schedule

1) Literature Research

- → Familiarization existing publications and internal preliminary work
- → Collection/derivation of transfer functions using Two-Port Theory

2) MATLAB GUI

- → Modeling of parameter uncertainties and definition of value ranges
- → Visualization of transfer functions under multiple parameter uncertainty
- → Implementation of a MATLAB GUI for interactive comparison of transfer characteristics in the context of parameter uncertainties

3) Verification

- → Modeling and simulation of the topologies in Matlab/Simulink/PLECS
- $\rightarrow\,$ Documentation of results

