

Universität Stuttgart Institut für Elektrische Energiewandlung

Power factor correction for efficiency optimization of a transcutaneous inductive transmission system

A significant and promising field of application for inductive energy transfer in medical technology is the supply of cardiac support systems in the 5-20 watt range. By replacing the percutaneous energy and data driveline with a transcutaneous inductive energy transfer system, it is possible to achieve complete implantability. This reduces the risk of infection for patients and improves their quality of life.

High efficiency and thus low losses are important, especially in this application. With this aim, the system is developed at iew is to be further optimized. The next step in the optimization process is to reduce the power loss of the power electronic components. Suitable circuit topologies as compensation for the reactive power that occurs are to be investigated as part of this work. Through initial research, suitable topologies are to be identified and evaluated in terms of their system behavior. These will then be examined with regard to their losses on the primary and secondary sides. In a first step, this will be done with simulations.

Optional depending on the type of thesis: Subsequently, the most suitable systems are to be set up and the simulation results validated by measurement. This should improve the overall efficiency of the transcutaneous energy transfer system.



risk of quality of → Independent and motivated way of working → Basic understanding of electrical engineering

Student Profile:

- → Knowledge in the field of inductive energy transmission desirable
- → Previous knowledge of MATLAB/Simulink
- → Knowledge of or interest in circuit simulation, ideally PLECS

Work steps:

- → Familiarization and literature research on transcutaneous inductive energy transfer systems and their power factor correction
- → Familiarization with MATLAB/Simulink and PLECS
- → Development of simulation models for loss optimization through suitable reactive power compensation
- → Optional: Setup and measurement of some/all topologies and validation of the simulation results

BA/FA/MA

Hardware / Prüfstand \\$ Literatur-

recherche

Auslegung / Modellierung

Regelung