Thesis Topic

Computational Electromagnetics Group
Department of Electromagnetic Field
Faculty of Electrical Engineering

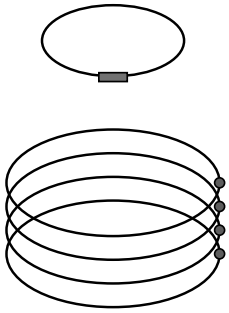
The CEM team offers the following topic

"Enhancing Performance in Wireless Power Transfer and Near-Field Communication"

to be chosen by a student and elaborated as the final thesis.

DESCRIPTION

Wireless power transfer (WPT) and near-field communication (NFC) are increasingly prevalent in the Internet of Things devices. Explore the technique developed by the CEM group to determine the optimal performance of the WPT/NFC devices and implement it in MATLAB. Account for realistic circuitry and the importance of proper matching. Investigate the design aspects of the transmitting/receiving coils on the performance, for example, the impact of the number of turns or the shape of the coil. Summarize recommendations for achieving the optimal design based on these findings.



CONTEXT

The topic will be solved within the prestigious Junior Start project of the Czech Science Foundation.
Collaboration with the members of the CEM group is expected.

PREREQUISITIES

Knowledge of programming, algebra, and basic knowledge of electromagnetism is expected.

REWARD

There is a monthly financial reward of ∼8.000 CZK (before tax) associated with the topic elaboration.

LITERATURE

[1] Lang, *et al.*: Convex Optimization of Wireless Power Transfer Systems With Multiple Transmitters, *IEEE Trans. AP*, vol. 62, pp. 4623–4636, 2014.

[2] Song, *et al.*: Wireless Power Transfer Based on Novel Physical Concepts, *Nature Electronics*, vol. 4, pp. 707–716, 2021.

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Visit the web page of our team at cem.elmag.org.

Surface current density on two plates, $ka = 0.5$.
The 9th mode of $\mathbf{X}_0\mathbf{I}_n = \lambda_n \mathbf{R}_0\mathbf{I}_n$ decomposition is depicted.