Thesis Topic

Computational Electromagnetics Group
Department of Electromagnetic Field
Faculty of Electrical Engineering

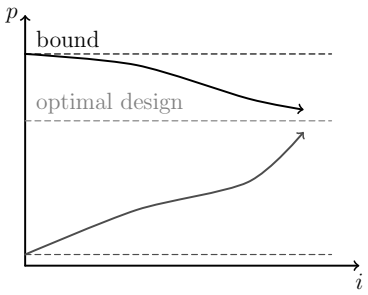
The CEM team offers the following topic

"Co-simulation of Shape Optimization and Fundamental Bounds"

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

DESCRIPTION

The performance limits of radiating devices and shape synthesis algorithms are well-established. However, the extent to which optimal designs deviate from these limits, known as tightness, remains largely unknown. Learn about convex optimization to examine these limits and heuristic optimization for shape synthesis. Connect these techniques to assess the gap between an actual and the best performance. Based on this knowledge, discuss possible enhancements, leveraging insights gained from analyzing the gap between the bounds and the actual performance.



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] Capek, *et al.*: Optimal Planar Electric Dipole Antennas, *IEEE AP Magazine*, vol. 61, pp. 19–29, 2019.

[2] Capek, *et al.*: Memetic Scheme for Inverse Design Using Exact Reanalysis of Method-of-Moments Models – Part 1: Theory and Implementation, arxiv: 2110.08044.

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Surface current density on two plates, $ka = 0.5$.
The 8th mode of $\mathbf{X}_0\mathbf{I}_n = \lambda_n \mathbf{R}_0\mathbf{I}_n$ decomposition is depicted.