

Thesis Topic

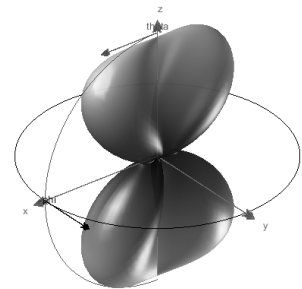
The CEM team offers the following topic

"Pareto-Optimal Currents Prescribed Far-Field Pattern and Radiation Efficiency"

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

DESCRIPTION

Antenna shape and excitation determine far-field radiation patterns. Any far-field pattern can be generated by allowing arbitrary current in the antenna region but at the expense of radiation efficiency. Study the trade-off between the desired pattern and its radiation efficiency. Explore scenarios like considering a specific pattern applied to arbitrary antenna structures or checking the possibility of generating isotropic patterns.



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] Gustafsson, *et al.*: Optimal Antenna Currents for Q, Superdirectivity, and Radiation Patterns Using Convex Optimization, *IEEE Trans. AP*, vol. 61, pp. 1109–1118, 2013.
- [2] Shi, *et al.*: Antenna Current Optimization and Realizations for Far-Field Pattern Shaping, arxiv: 1711.09709.

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Surface current density on two plates, $ka = 0.5$.
The 6th mode of $\mathbf{X}_0 \mathbf{I}_n = \lambda_n \mathbf{R}_0 \mathbf{I}_n$ decomposition is depicted.