Thesis Topic

Computational Electromagnetics Group
Department of Electromagnetic Field
Faculty of Electrical Engineering

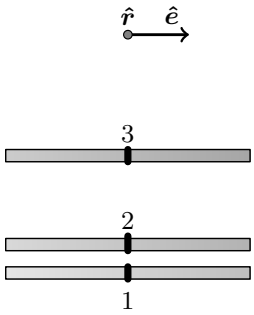
The CEM team offers the following topic

"Minimal Realization of End-Fire Antenna Arrays for Directional Communication Links"

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

DESCRIPTION

End-fire arrays are compact devices known for their manufacturing-friendly layouts and high-gain performance. Increasing the number of elements typically results in a higher achievable gain, but this comes with diminishing returns and increased sensitivity to manufacturing and matching conditions. Use existing theory and tools to establish upper bounds on gain, taking into account the number of elements, feeders, and matching conditions. Explore optimization techniques to improve the shape of the radiators and go beyond standard theory considering uniform arrays. Find optimal reactive elements to boost the gain and improve matching. The final designs will be manufactured and measured.



CONTEXT

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

PREREQUISITIES

Knowledge of programming and algebra is expected.

REWARD

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

LITERATURE

[1] Collin and Zucker: *Antenna Theory, Part 1*, McGraw-Hill, 1969.

[2] Capek, *et al.*: Finding Optimal Total Active Reflection Coefficient and Realized Gain for Multi-port Lossy Antennas, *IEEE Trans. AP*, vol. 69, pp. 2481–2493, 2021.

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Surface current density on two plates, $ka = 0.5$.
The 3rd mode of $\mathbf{X}_0\mathbf{I}_n = \lambda_n \mathbf{R}_0\mathbf{I}_n$ decomposition is depicted.