

AUFGABE DER BACHELOR-/MASTERARBEIT

im EIT-Bachelor-/Master- und ISE-Bachelor-/Master-Studiengang

für: **zu vergeben**

gestellt von: **Prof. Dr.-Ing. Andreas Czylik**

Thema: Linear Antenna Array Optimization Using Genetic Algorithms

In wireless communications, particularly at millimeter-wave and terahertz frequencies, antenna arrays are essential for enhancing beamforming and steering. The optimization of these arrays involves complex challenges like directivity maximization and sidelobe level minimization. Genetic algorithms (GAs), inspired by natural selection, provide a robust method for this optimization. By iteratively applying selection, crossover, and mutation, GAs effectively refine solutions, allowing for the precise adjustment of array parameters to meet performance objectives.

The objective of this thesis is to employ genetic algorithms within MATLAB to refine linear antenna array designs, focusing on optimizing key parameters such as the number of elements, excitation amplitudes, phases, and inter-element spacings. This aims at developing arrays which exhibit desired radiation characteristics.

The task entails the following:

- Creating a time and work plan,
- getting acquainted with the principles of beamforming through linear antenna arrays and their optimization using genetic algorithms in MATLAB,
- applying genetic algorithms to adjust different array parameters in order to optimize the radiation characteristics,
- examining the impacts of various genetic algorithm parameters, such as mutation rates and population size on the optimization performance,
- documentation of the work,
- final presentation of the work and
- submitting a digital copy of documentation and presentation in PDF format.

Zweitgutachter: Prof. Dr.-Ing. J.C. Balzer

Duisburg, _____

Betreuer: _____

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