Guidelines for Student Reports

IA-based Strategies for the Analysis and Design of Linear Arrays based on Multi-Layer Architectures

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Abstract

Interval Analysis (IA) is a powerful tool that recently has been exploited to handle manufacturing errors and more in general, tolerances, that affect the devices (amplifiers, phase shifters) composing the feeding network of an antenna array. Interval arithmetic allows to compute conservative bounds on the power pattern which ensure to include the power radiated even in presence of errors and malfunctions of the considered devices.
This project is subdivided in two parts: in the first part, the IA will be exploited to analyze "multi-layer" array configurations with amplifiers/phase shifters placed at multiple levels, in order to evaluate the impact of errors on the nominal value of amplifiers and phase shifters (at different levels) to the radiated power pattern. The second part is aimed to synthesize, through a suitable optimization technique based on interval analysis, the control point interval values of linear arrays based on "multi-layer" architectures. The objective is to find the maximum amplitude tolerances (or analogously the phase tolerances) of each control point composing the array which allow to meet the requirements specified by a radiation pattern mask.

Reference Bibliography: Interval Analysis, Array Synthesis and Array Analysis [1]-[6]; Interval Analysis and Reflector Antennas [7]-[8]; Evolutionary Optimization [9]-[10].

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This report is submitted in partial fulfillment of the degree of the course "ACM".
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