Guidelines for Student Reports

TOLERANCE ANALYSIS IN SUB-ARRAYED ANTENNAS BY MEANS OF A PROBABILISTIC METHODOLOGY BASED ON INTERVAL ARITHMETIC

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Abstract

Sub-arraying techniques are commonly used in the synthesis of array antennas, especially for large arrays since they allow to group the elements into sub-arrays reducing the number of control points in the feeding network. The reduction in the complexity of the antenna architecture allows a significant decrease in costs and a simplification in array manufacturing. Calibration operations should be theoretically simplified, as well, because of the reduced number of control points to be handle, but random errors still remain difficult to identify and correct. Recently, Interval Analysis (IA)-based methods have been developed to predict the effects of uncertainties in amplitude values, arising from the non-ideality of the electronic components, on the radiation pattern. However, such approaches assign the same probability (i.e., a uniform probability distribution) for each value within the tolerance interval. This project is aimed to propose a novel approach aimed at dealing with sub-arrayed architectures by taking into account Gaussian probability distribution functions modelling the statistical behavior of the amplitude deviations with respect to the nominal value of the amplifiers.

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