Guidelines for Student Reports

PERFORMANCES ANALYSIS OF A PSO-BASED OPTIMIZATION PROCEDURE AIMED TO RECONFIGURE A PATTERN GENERATED BY A TIME-MODULATED PLANAR ARRAY SUBJECT TO FAILURES

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Abstract

In the last years, time-modulated arrays have gained a growing interest since they overcome some classical drawbacks of the amplitude-weight control by arbitrarily shaping the radiated pattern by means of the modulation of the static excitations with a set of radiofrequency (RF) switches. Nevertheless, two main problems have limited the consideration of this type of array in the past: the necessity to use reliable RF switches operating at high frequency, and the generation of unwanted harmonics, the so called sideband radiation (SR), which represent a loss in term of radiated power. The new generation of RF switches thanks to the recent advance in nano-technologies are able to satisfy the operative requirements; moreover, the use of global optimization algorithms have shown that the problem of the sideband radiation can be properly handled.

As well as any type of electronic components, RF switches are subjects to failures: in the applications where it is not possible to carry out a continuously and manually maintenance, (for example satellite applications), in the presence of possible RF switches failures it is necessary to proceed with an automatically correction. This project proposes an adaptive failure correction based on the particle swarm optimization algorithm (PSO): the objective is to keep the radiating characteristics of the antenna array (and hence the power pattern) in presence of RF switches failures as well, using the PSO algorithm to reconfigure the time-modulating functions of the still active elements composing the array.

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