Guidelines for Student Reports

Synthesis of sparse time-modulated linear arrays

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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.
This project proposes a PSO-based synthesis technique of sparse time-modulated arrays, in order to reduce the number of elements and minimizing the sideband radiation, applying a joint optimization of pulse durations, pulse shifts and positions of the elements, and exploiting a very effectvive closed-form equation proposed in the literature to evaluate the amount of wasted power in sideband.

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