QUANTIZED PULSE SPLITTING WITH OPTIMIZED TIME-STEPS FOR SECURE COMMUNICATION IN TIME-MODULATED LINEAR ARRAYS

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Abstract

In the last years, time-modulated arrays (TMAs) 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.

In the recent years, time-modulated arrays have been studied by a new perspective in which part of the sideband radiation is exploited for useful purposes. In this framework, this project is aimed to propose a novel synthesis technique for security applications based on a customized version of the genetic algorithms. More in detail, the modified-GA developed in literature will be exploited to determine suitable pulse sequences (with quantized/splitted on-time) to keep fixed the instantaneous directivity during the modulation period, in order to nullify the sideband radiation (SR) along the direction of the desired signal and to exploit the SR to encrypt the signal radiated in the sidelobe region.

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