Guidelines for Student Reports

Adaptive SINR-based Thinning Technique for Smart Antennas

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Abstract

An adaptive antenna array is a system that controls its radiating characteristics by means of feedback control while the antenna operates, acting on the excitations of the elements composing the array. Adaptive array are key devices for many applications in radars and communications because of the need to properly receive a desired signal in the presence of interferences or jammers, as well. Several techniques have been proposed to control the element weights for synthesizing the beam pattern nulls along the direction of arrival (DoAs) of the undesired signal: phase-only adaptive strategies are usually preferred to the use of tunable amplitude weights due to the cheap costs and the reliability of digital phase shifters. But in the last years other techniques with simple circuital complexity and high flexibility are considering in array synthesis, for example time-modulated arrays, where the pattern synthesis is obtained by means of controlling a set of RF switches inserted in the feed network of the array. The considerable advantage of reconfiguring the array pattern by simply adjusting the on-off switching sequence, allows to consider this strategy as a good candidate for time-varying scenarios with respect to classical phased array. This simple circuital configuration can be adopted for an adaptive thinning technique as well, where the pattern is synthesized acting on the state (on - off) of the RF switches connected to the elements of the array. This particular solution permits high adaptation velocity and reduction of systematic and random errors present in conventional phased array.
The proposed technique is based on an evolutionary algorithm with binary coding to determine the dynamic configuration of the array element's state in a time-varying scenario.

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This report is submitted in partial fulfillment of the degree of the course "ACM".
Supervisors: Prof. Andrea Massa, Dr. Lorenzo Poli, Dr. Paolo Rocca.