

Sintesi di Thinned Array Adattivi per Comunicazioni Satellitari

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Abstract

Il thinning (assottigliamento) di array è una tematica studiata da molti decenni per la sintesi di antenne di grandi dimensioni. Recentemente, i thinned array hanno riscontrato notevole interesse sia in ambito scientifico sia applicativo (ad es., comunicazioni satellitari, radioastronomia) in quanto, a differenza dei più classici phased array, utilizzano un ridotto numero di elementi con eccitazioni uniformi (solitamente unitarie). I vantaggi di questo tipo di approccio sono notevoli. Da un lato, la riduzione del numero di elementi risulta in notevoli vantaggi in termini economici e di peso. Dall'altro, il fatto di utilizzare elementi uniformemente alimentati permette di semplificare la struttura circuitale della rete di alimentazione e quindi la complessità. In questo ambito, gli approcci più comuni sono di tipo statistico (random arrays) o sono basati su tecniche euristiche. Queste tecniche si sono dimostrate molto efficienti nella sintesi di array con lobi secondari bassi. Nonostante ciò, la presenza di interferenti o jammer, seppur al di fuori della regione del lobo principale, può ridurre in modo drastico la qualità della comunicazione. In questo ambito, il progetto ha l'obiettivo di definire una strategia innovativa per sintetizzare thinned array riconfigurabili in grado di adattarsi in modo dinamico e sopprimere (nulling) i segnali interferenti posizionando un nullo del diagramma di radiazione nella direzione del segnale indesiderato. L'approccio considera un classico array "pieno" (senza thinning) dove ciascun elemento è provvisto di uno switch che permette di collegare o scollegare l'elemento radiante dalla rete di alimentazione. Agendo sugli switch (ovvero accendendo e spegnendo gli elementi) è quindi possibile ottenere varie configurazioni di thinning. In presenza di un segnale interferente, la sequenza di thinning viene adattivamente riconfigurata (tra un set di configurazioni opportunamente definito) al fine di annullare l'interferente.

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