

PATTERN SOMMA E DIFFERENZA PER MEZZO DI ARRAY DI ANTENNE AD ELEMENTI PARASSITI

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Abstract

Pattern somma e differenza sono solitamente utilizzati in applicazioni di tipo monopulse radar tracking, dove i segnali misurati sui due modi (somma e differenza) sono confrontati tra loro per identificare la posizione angolare di un target. Ad oggi, i sistemi di antenne che permettono di generare tali pattern sono costituiti da antenne paraboliche multi-feeder, oppure da array (lineari o planari) aventi una doppia (completa o divisa in subarray) rete di alimentazione. Nel caso di array di antenne, i problemi principali sono dovuti all'elevata complessità circuitale (in quanto è necessario un divisore di potenza su ciascun elemento dell'array) e ai relativi costi.

Recentemente, l'utilizzo di 2 array di antenne, uno composto da N elementi (es., dipoli) attivi (alimentati), mentre l'altro composto da M elementi simili ai precedenti ma in questo caso parassiti, è stato presentato come metodo che permette di adattare il diagramma di radiazione, con HW semplificato e quindi minor costo.

In particolare, la corrente indotta sugli elementi parassiti varia sulla base degli effetti di mutuo accoppiamento dovuti al campo generato dagli elementi attivi. Di conseguenza cambia la "corrente equivalente" sull'apertura dell'antenna ed il relativo pattern generato. Andando a modificare la posizione degli elementi parassiti posti di fronte all'array di elementi attivi, si riesce a modificare quindi il diagramma di radiazione dell'antenna.

Lo scopo di questo progetto è quello di sintetizzare un array ad elementi parassiti che permetta di generare sia un pattern somma sia un pattern differenza. In particolare, partendo dalla considerazione che le distribuzioni dei coefficienti ottimi somma (e.g., Taylor) e differenza (e.g., Bayliss) differiscono principalmente al centro dell'apertura, l'obiettivo del presente progetto riguarda la sintesi di pattern somma e differenza di array lineari in cui:

- (a) fissati i coefficienti dell'array attivo a quelli di un pattern somma ottimo,
- (b) si definiscano posizioni e dimensioni degli elementi parassiti, al fine di poter generare anche un pattern differenza, il più possibile simile a quello ottimo (excitation matching), ottenuto alimentando l'array attivo per mezzo di una distribuzione ottima di coefficienti.

In questo studio, l'analisi è focalizzata sulla sintesi di array lineari.

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