

# ANT COLONY OPTIMIZATION FOR SUM AND DIFFERENCE PATTERN

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## Abstract

La tecnica monopulse radar tracking utilizza i pattern somma e differenza per ricavare la posizione angolare di un oggetto. Questi tipi di fasci sono generati utilizzando un array lineare di elementi alimentati non uniformemente. Le eccitazioni sono calcolate utilizzando i polinomi di Chebyshev per quanto riguarda il fascio somma e utilizzando i polinomi di Zolotarev per i fasci differenza. I pattern sono costruiti utilizzando due reti di alimentazioni separate ed indipendenti. Tale soluzione non è di norma utilizzata per problemi relativi all'occupazione di spazio e alla compattità circuitale; si preferisce dunque generare un pattern somma ottimo e considerare invece un pattern differenza approssimato raggruppando tra loro elementi dell'array in sub-array detti aggregazioni e assegnando ad ogni sub-array un peso. Il problema risulta dunque essere quello di trovare in che modo raggruppare gli elementi dell'array e che peso associare ad ogni aggregazione in modo tale che il pattern differenza generato sia il più possibile simile a quello obiettivo ("ottimo"). La soluzione può essere trovata considerando il percorso a costo minimo all'interno di un albero binario non completo.

Il percorso ottimale all'interno dell'albero va ricercato per mezzo di un algoritmo di ottimizzazione detto Ant Colony. L'algoritmo si ispira al comportamento delle formiche in cerca di cibo. Le formiche che trovano il percorso più breve (che per noi vuole dire migliore) ritornano prima.

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