Guidelines for Student Reports

Tecniche di Sub-Arraying basate su Almost Difference Sets e Difference Sets

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Abstract

La realizzazione di sistemi radianti per applicazioni di radio-astronomia richiedono l'utilizzo di array di grandi dimensioni con un numero molto limitato di elementi radianti ed in grado di garantire valori molto ridotti di lobo secondario. Tali obiettivi sono solitamente ottenuti mediante tecniche di sub-arraying che permettono di dividere la difficoltà del problema di sintesi nei seguenti sotto-problemi
(a) design dei sub-array (selezione elementi all'interno del lattice di interesse)
(b) selezione alimentazione ottima per i sub-array da accorpare
Una soluzione molto efficiente e performante a tali problemi può essere basata sulle metodologie di progettazione basate su Almost Difference Sets e Difference Sets recentemente introdotte per il design di thinned arrays.
In particolare, tali metodologie
- permettono la realizzazione di sub-array con prestazioni eccellenti dal punto di vista del peak sidelobe level [problema (a)]
- permettono di accorpare i subarray in modo efficiente, agendo come schema di thinning di secondo livello [problema (b)] Mediante tale approccio è quindi possibile
- realizzare thinned arrays di grandi dimensioni con prestazioni elevate e thinning molto spinto (pochi elementi accesi)
- realizzare interleaved arrays multi-frequenza con numerose frequenze di funzionamento
Scopo della presente attività è quello di studiare ed analizzare l'applicazione della metodologia di progetto basata su DS e ADS al sub-arraying. L'obiettivo è quello di selezionare sequenze di eccitazione tali da garantire prestazioni elevate nelle applicazioni di interesse (interleaved o thinned arrays). L'attività si occuperà di definire e analizzare i criteri di sintesi più opportuni, e di valutare i design risultanti. L'attività includerà anche una verifica numerica dei risultati ottenuti in una applicazione selezionata.

Reference Bibliography: Analytic Sequences [15]; Analytic Sequences and Array Synthesis [1]-[14]; Array Synthesis [16]-[66].

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