

Interval Analysis as applied to the evaluation of the robustness of antenna arrays to random excitation errors

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Abstract

La realizzazione fisica di una schiera di antenne comporta l'introduzione di errori sulla fase e sull'ampiezza delle eccitazioni degli elementi radianti dovuti ad imperfezioni nei singoli componenti dell'antenna e della rete di alimentazione. Ad esempio, una schiera progettata per rispettare determinati vincoli in termini di diagramma di radiazione può non soddisfare più le specifiche di progetto in presenza di tali errori. Per questo motivo la sintesi di array di antenne che, oltre a soddisfare i vincoli progettuali presentano anche buone doti di robustezza agli errori riveste un ruolo molto importante nelle applicazioni pratiche.

Questo progetto consiste nell'effettuare l'analisi della robustezza agli errori sulle eccitazioni di differenti configurazioni di pesi, con l'obbiettivo di: -classificare le varie tipologie di array in base alla robustezza agli errori sulle eccitazioni ottenute.

-definire delle linee guida che consentano di scegliere la tipologia di array più adatta in base alle specifiche di robustezza agli errori desiderate. La soluzione adottata per raggiungere questo obbiettivo si basa sull'utilizzo dell'Interval Analysis per:

a) tenere conto delle tolleranze dei componenti rispetto ai valori nominali definendo i pesi degli elementi dell'array come intervalli anziché come valori puntuali b) calcolare tramite l'aritmetica per intervalli il range di valori assunti dal pattern dell'array assumendo che le eccitazioni appartengano a tali intervalli

c) analizzare il "Pattern Intervallo" ottenuto, verificando quanto si discosta dal pattern nominale (senza errori)

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