Pengembangan metode sintesis antena susun sparse dengan interleaved sub-arrays untuk sorot ganda dan polarisasi ganda = Development of synthesis methods of sparse interleaved antenna sub-array for dual beam dual beam dual polarization

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Abstrak

Penelitian ini mengksploitasi sifat komplementer dari set combinatorial Cyclic Difference Set (CDS) dan set bilangan ganjil dan genap guna memperoleh susunan interleaved untuk peningkatan utilisasi ruangan aperture antena susun linier. Penambahan elemen secara simetris terhadap titik awal dengan mengikuti taper yang berbeda menghindari tumpang tindih antarelemen antena sekaligus meningkatkan keluwesan penyesuaian terhadap ketersediaan ruangan kargo kendaraan peluncur satelit komunikasi.
Konversi taper amplitudo menjadi taper jarak dari elemen antena yang ditambahkan dilakukan melalui prinsip equal illumination area dengan tingkat ketepatan yang dicapai melalui minimisasi weighted mean squared eror. Penggunaan taper yang berbeda menjamin tidak adanya tumpang tindih antarelemen antena susun. Penggunaan elemen antena yang berbeda memungkinkan dibangunnya antena susun linier dengan sorot ganda terpolarisasi linier dan sorot ganda terpolarisasi ganda melingkar. Peletakan elemen antena susun secara simetri menjaga kemurnian polarisasi sehingga memungkinkan penyorotan area pelayanan yang overlap tanpa saling mengganggu.
Kedua antena susun yang disintesa yaitu Faktor Array Complementary Improved Interleaved CDS Array dan Faktor Array Complementary Improved Alternate Interleaved Array. Keduanya bebas grating lobe dan dicatu dengan amplitudo yang seragam sehingga menampilkan efisiensi konversi arus searah ke gelombang radio yang tinggi dan menampilkan keandalan sistem pada aplikasinya di satelit komunikasi.
.....The study exploited complementary properties of the combinatorial set Cyclic Difference Set (CDS) and sets odd and even numbers to obtain an interleaved arrangement for improved aperture room utilization on linear stacking antennas. The addition of elements symmetrically to the origin by following a different taper avoids overlap between antenna elements while increasing the flexibility of adjustment to the availability of the cargo satellite of the communication air launchers.
The amplitude taper conversion to the distance taper of the additional elements were done through the principle of the equal illumination area with a precision level achieved through the minimization of weighted mean squared error. The use of different tapers guarantees the absence of overlapping collilers between the stacking antenna elements. The use of different antenna elements allows the construction of a linear stacking antenna with a double of linearly polarized beams and double circular polarization beams. The symmetry of the stacking antenna element maintains the polarization purity allowing for the beam of overlapping service areas without interferering each other.
The two interleaved array antennas were the antenna arrays of the Array Factor Complementary Improved Interleaved CDS Array and Array Factor Complementary Improved Alternate Interleaved Array. Both of the mentioned arrays are free of grating lobe and were supplied simply with a uniform amplitude which improves efficiency of the direct current to radio frequency conversion and system reliability in

communication satellites.