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Design of Non-uniform Circular Antenna Arrays Using Firefly Algorithm for Side Lobe Level Reduction

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Abstract : A design problem of non-uniform circular antenna arrays for maximum reduction of both the side lobe level (SLL) and first null beam width (FNBW) is dealt with. This problem is modeled as a simple optimization problem. The method of Firefly algorithm (FFA) is used to determine an optimal set of current excitation weights and antenna inter-element separations that provide radiation pattern with maximum SLL reduction and much improvement on FNBW as well. Circular array antenna laid on x-y plane is assumed. FFA is applied on circular arrays of 8-, 10-, and 12- elements. Various simulation results are presented and hence performances of side lobe and FNBW are analyzed. Experimental results show considerable reductions of both the SLL and FNBW with respect to those of the uniform case and some standard algorithms GA, PSO, and SA applied to the same problem.

Keywords : circular arrays, first null beam width, side lobe level, FFA
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