SYNTHESIS OF UNEQUALLY SPACED LINEAR MICRO STRIP RECTANGULAR PATCH ANTENNA ARRAY USING IMPROVED LOCAL SEARCH PARTICLE SWARM OPTIMIZATION

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ABSTRACT

Antenna array systems with low side lobe levels are essential for today wireless communication systems. This paper presents the synthesis of unequally spaced linear rectangular micro strip antenna array with minimum side lobe levels using the novel evolutionary algorithm known as improved local search particle swarm optimization (ILSPSO). ILSPSO is a modified version of particle swarm optimization (PSO), in which Gaussian distribution is used to enhance the local search of the PSO. In this paper, ILPSO is applied to optimize the positions of the micro strip antenna elements to suppress the peak side lobe level (PSLL) along with PSO and differential evolution (DE) algorithms. The steps involved in problem formulation along with design examples illustrating the performance of the ILPSO in minimizing the side lobe levels are demonstrated. A 20 and 32 element linear micro strip rectangular patch antenna (MSRPA) element are considered to show the effectiveness of the proposed method. The optimized micro strip antenna array is simulated using high frequency structure simulator (HFSS). The synthesis results demonstrate that the ILSPSO outperforms PSO and DE in terms of producing lower PSLL and convergence rate. The flexibility and ease of implementation of the ILSPSO algorithm is obvious from this paper, showing the algorithms usefulness in other array synthesis problems.

KEYWORDS: Antenna Array, Peak Side Lobe Level, Particle Swarm Optimization, Differential Evolution, Gaussian Distribution, Micro Strip Rectangular Patch Antenna, HFSS