REVIEW OF ADAPTIVE LINEAR ANTENNA ARRAY PATTERN OPTIMIZATION

SMITA BANERJEE[1] & VED VYAS DWIVEDI[2]

[1]Research Scholar, School of Engineering, R K University, Rajkot, Gujarat, India

Sr. Lecturer, Department of Electronics and Communication Engineering, V.V.P. Engineering College, Rajkot, Gujarat, India (Parent institute)

[2]Director & Principal, Noble Engineering College, Junagadh, Gujarat, India

ABSTRACT

The main aim of designing an adaptive antenna array is to steer the main beam in the directions of the desired signals and steering nulls in the directions of the interfering signals. The adaptive antenna system can provide a greater coverage area for each cell site, higher rejection of interference and cost-down benefit of equipment. The major area of interest in phased and adaptive arrays is their application to problems arising in radar and communication systems, where interference suppression and high reliability is required. Null control in an antenna arrays can be achieved with different techniques such as: Perturbation of elements position, phase control of each element, amplitude control of each element and combination of amplitude and phase controls of each element.

The objective function involved in the optimization process for the design of adaptive arrays is complex. The genetic algorithm (GA) emerged as a competent optimization algorithm for a wide range of complex cost functions. The uses of GAs have shown great potential in the solution of complex problems related to the design of antenna optimization and have been an extremely active area of research. This paper presents several applications of GA for adaptive antennas. This paper demonstrates the use of GA to adaptively control antenna characteristics. The example demonstrates that the GA can quickly places nulls in the sidelobes in the directions of the interfering signals by minimizing the total output power. This paper reviews adaptive linear antenna array optimization.

KEYWORDS: Adaptive Linear Array, Phase Array Antenna, Genetic Algorithm, Adaptive Nulling, Null Steering, Sidelobe Level Reduction, Pattern Nulling, Amplitude Perturbation, Phase Perturbation