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Thinned Elliptical Cylindrical Antenna Array Synthesis Using Particle Swarm Optimization

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Abstract : This paper describes optimal thinning of an Elliptical Cylindrical Array (ECA) of uniformly excited isotropic antennas which can generate directive beam with minimum relative Side Lobe Level (SLL). The Particle Swarm Optimization (PSO) method, which represents a new approach for optimization problems in electromagnetic, is used in the optimization process. The PSO is used to determine the optimal set of 'ON-OFF' elements that provides a radiation pattern with maximum SLL reduction. Optimization is done without prefixing the value of First Null Beam Width (FNBW). The variation of SLL with element spacing of thinned array is also reported. Simulation results show that the number of array elements can be reduced by more than 50% of the total number of elements in the array with a simultaneous reduction in SLL to less than -27dB.

Keywords : thinned array, Particle Swarm Optimization, Elliptical Cylindrical Array, Side Lobe Label.
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