Thinning of Aperiodic Antenna Arrays for Low Side-Lobe Levels and Broadband Operation Using Genetic Algorithms

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Abstract: In this paper we present and discuss the thinning of antenna arrays that are based on aperiodic tilings. Aperiodic tilings are a class of tilings that cover the plane without gaps or overlaps and do not exhibit any long-range translational symmetry. By utilizing these tilings in array design it is possible to generate naturally thinned arrays that exhibit broadband properties. We will show that by using a Genetic Algorithm (GA) it is possible to further thin such aperiodic arrays in order to minimize the side-lobe levels (SLL) while simultaneously enhancing the desirable broadband properties. The technique will be demonstrated by considering the design of a specific thinned aperiodic array and comparing its performance to a thinned periodic array.