# Circularly Polarized Microstrip Antenna for Suppression of Mutual Coupling in Antenna Arrays

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Performance of antenna arrays suffers when there is significant mutual coupling between array elements. Mutual coupling in planar antenna arrays printed on dielectric substrates is primarily due to surface waves. Microstrip patch antennas are very attractive for many applications due to the ease of fabrication, low cost, low weight, and ease of integration with other electronics. However, microstrip antennas built on dielectric substrates suffer from excitation of surface waves, increasing mutual coupling in microstrip arrays. Methods for reduction of mutual coupling include the use of metamaterials, inclusion of bandgap structures, the use of especially designed array elements, and methods for lowering the effective dielectric constant of the substrate. In this paper, we focus on the design of the array element to suppress surface waves in order to minimize mutual coupling in arrays built using such elements.

In this work, a circularly polarized modified circular microstrip patch antenna is investigated. The modifications include the addition of shorting pins in addition to inclusion of a slot and edge truncations to produce a circularly polarized array element that does not excite surface waves. The designed element has higher gain and a more directional radiation pattern than a similar conventional microstrip patch antenna. Its performance in arrays is also investigated to assess reduction in mutual coupling and other radiation characteristics. In order to improve circular polarization bandwidth, sequential rotation techniques using the proposed antenna were also investigated. Mutual coupling reduction throughout the bandwidth of the sequentially rotated array is also assessed. Potential applications, primarily for beam scanned arrays for wireless power transfer, are discussed. The design procedure, simulation results obtained using Ansys HFSS, as well as experimental results will be presented at the conference.