Comparison and Analysis of Ground Plane Slot Structures for Cosited Antennas

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Mutual coupling can degrade the performance of antennas that share a ground plane. Besides physically moving the antennas or changing their polarization, methods of reducing coupling typically involve placing some structure between the antennas. Since antenna designers often have little control over the placement of their antenna in a package, these isolation-reducing structures may sometimes be the only option. One promising type of structure consists of resonant slots in the ground plane. Since slots require no added material or vias, and the feature size is not extremely small, these are an inexpensive and simple solution to the problem of coupling.

Three different ground plane slot designs have been reported for isolation of cosited antennas. However, no consistent model or design process has been reported. In this work, the behavior of ground plane slot structures reported by Alvey (Univ. of Illinois M.S. Thesis, 2006) and Chiu et al. (IEEE Trans. Ant. Propagat., 55, 1732-1738, 2007) is compared in order to gain some insight into the operation of ground plane slot isolation structures in general.

The Alvey and Chiu slot structures are designed for systems with different operating frequencies and different substrates, so two comparison cases are presented. In each, one of the designs is scaled to operate in the other design's system. Simulated results will be presented in which the designs' behavior will be examined. This will include a comparison of the two designs' success at their objective of improving isolation between the test antennas, as well as discussion of undesired behavior such as backplane and cross-polar radiation.