Analysis of the Perturbation's Size on the Dual-Mode Resonator with Capacitive Coupling Feeding.

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In this work, the behavior of the dual-mode microstrip square loop with square patch attached to inner corner using capacitive coupling topology feeding is analyzed. The structure is modeled using the Finite Differences Time Domain method (FDTD) with a spatial discretization of Dx = Dy = 0.466 mm and Dz = 0.423 mm. Since the microstrip structure is an open region problem, we utilized the first order Mur absorbing boundary condition to truncate the mesh and limit the size of the spatial region (G. Mur, IEEE Trans. Electromagn. Compat., 23, 377-382, 1981).
To observe the mode splitting, the dual-mode loop resonator has been simulated with different perturbation size (P). The split between the mode frequencies increases as the size (P) increases. The gaps of the capacitive coupling, used to feeding the dual-mode resonator, are projected for maximum power transfer. To find the size gap optimum, the dual-mode resonator with perturbation size P = 1.86, and different capacitive coupling has been simulated. The increase of the coupling gap results in a narrowing bandpass. For great values of coupling gap, the transmission zeros in the insertion loss response begin to move away.
The procedure of design permits improves the frequency response choosing first the size of perturbation element and later the adequate input/output capacitive coupling gap. It has been demonstrated that with this arranges is possible to move the transmission zeros and to adjust the filter tune. As final results we have one superior frequency response.