Abstracts

Reduced size capacitive defect EBG resonators

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The concept of a capacitive defect in a periodic lattice is examined. An eigenvalue analysis has been performed to determine the resonant frequency of a capacitive section that forms a defect in an otherwise periodic lattice of metallic vias. This concept presented herein addresses one of the major concerns in a defect mode resonator scheme: the overall size of the structure. Theoretically by loading the cavity with a capacitive load, a size reduction up to a full order of magnitude can be achieved depending on the height of the capacitive post. Furthermore the Q remains relatively the same even with a substantial size reduction. However as a practical issue, the sensitivity of the resonant frequency limits the achievable reduction for a given set of fabrication tolerances. The sensitivity of the resonator frequency and the resonant quality factor of a capacitive defect resonator has been the focus of this study. In the evanescent defect EBG resonator presented herein, the second order resonance is not an integer multiple of the dominant resonant frequency thus resulting in a very clean spectrum. As an example of an application for this EBG resonator, multiple capacitive defects in a metallo-dielectric EBG substrate have been coupled to form a reduced size multipole filter.

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