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Study of Pass Band Resonance Characteristics of Aperture Type FSS

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ABSTRACT

In this paper, the resonance characteristics of aperture type frequency selective surface (FSS) is presented. A systematic investigation is carried out to design the compact FSS. The optimized structure consists of rectangular Archimedean spiral with inter-digital capacitance. Resonance characteristics is verified in both single-layer as well as the double-layer approach by embedding FSS on one side of the dielectric substrate. The performances of the dual-layer are observed by varying air-gap between two FSS layers. The structure offers satisfactory resonance (transmission and reflection) characteristics at optimum air-gap of 7 mm between two layers with the 3dB cutoff region over a frequency range (3.66-4.66 GHz). Finally, an array of 31×31 FSS elements of two layers is fabricated for experimental characterization. A close agreement between simulated and measured results is observed.

Keywords: Inter-digital Capacitance, FSS, Dual-layer , Resonance, Aperture.

1. INTRODUCTION

With the increase of wireless technology, the wireless devices are established for various applications across the usable operating frequency band [1]. However, in certain places, the use of allowing desired frequencies and blocking other frequencies, adjacent to the desired frequencies, may be advantageous. In order to filter out certain frequencies, traditional filters may normally be adapted in radio frequency (RF) circuits. In comparison to traditional filters, frequency selective surfaces (FSS) structures have a significant role in either to stop or pass the spectral behavior. These surfaces are periodic structures that are repeated in one or two-dimensional periodic manners. The single periodic element of FSS is referred as a unit cell.

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