

Study of resonators Function using FSS structures for application in TAGs passive.

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Abstract

This project consisted to study and analyze selector structures frequency FSS (Frequency Selective Surfaces), together with the study of HIS resonators (high impedance surface) that can be used to create metamaterials. The study of these devices is promising, because it can be used in miniaturization of RF components, in the increase of the gain of the systems and the reduction of costs of manufacture of these components, etc. In the project was explored the application of these resonators function in passive tags that are used in RFID systems. Through the construction of a model in the software Ansoft HFSS of these structures, was simulated its electromagnetic behavior and evaluated its performance in comparison with work already published.

Key words: TAGs, FSS, RFID

Introduction

Currently is being studied, the employability of complex materials, that have an index of negative refraction and are used to improve the performance and the absorption of electromagnetic TAGs and antennas, therefore increasing its gain and allowing the miniaturization of the device. The FSS are planar structures composed of a metallic layer on one or more dielectric substrates, which when suffer a disturbance through the electromagnetic radiation, allows the resonator change its characteristics.

This work is being proposed apply structures FSS in passive tags. The activities in the project covered, above all, a broad review of the literature on the principles of operation of the systems using Tags in general, in which are shown the improvements which the FSS structures and HIS offer to these TAGs.

Results and Discussion

After the completion of a broad theoretical study was performed simulations that have enabled us to find a peculiar characteristic on the FSS structures, in which changing the angle of the resonator can be controlled in a manner more gradual the frequency of operation of these TAGs. Figure 1 shows resonators function of 2 bits constructed varying geometric angle. For the assembly of this resonator the substrate chosen was the F4B-2, which has relative permmissivity (ϵ_r) equal to 2.65, tangent of loss ($\tan\delta$) equal to 0.001, and some variables such as "dp", "ds" and "dg" which allow to do a study on the behavior of these resonators function.

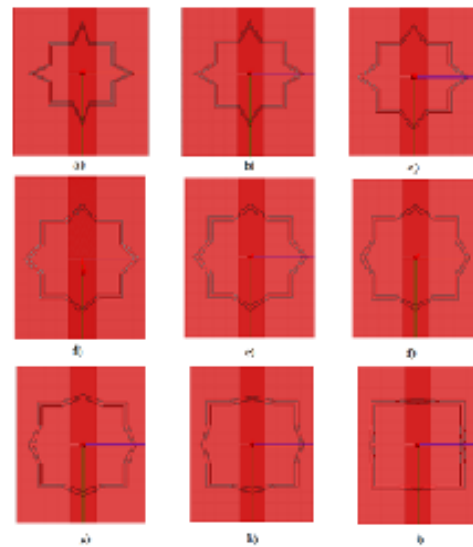


Figure 1. Resonators' Function of 2 bits, with the angle: a) 45°, b) 60°, c) 75°, d) 90°, e) 105°, f) 120°, g) 135°, h) 150° e i) 175°.

Conclusions

The project shows a characteristic yet little explored in which paves the way for a contribution to the miniaturization of passive tags using structures FSS and HIS, that allow the control of the frequency of operation of such antennas more gradual, in addition to the increase in gain. Contributing directly to reduction of devices and reduction of the cost of the system.

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[1] B. A. Munk, "Frequency Selective Surfaces – Theory and Design", John Willey and Sons, Inc., New York, 2000..