Multi-band High Impedance Frequency Selective Surfaces

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Frequency Selective Surfaces (FSS) have been recently suggested for use in the design of electromagnetic meta-materials that behave like a Perfect Magnetic Conductor (PMC) (F. Yang, K. Ma, Y. Qian, and T. Itoh, *IEEE Trans. Microwave Theory Tech.*, **47**, 1509-1514, 1999). It has been shown previously that an FSS screen acting as a PMC can be used to improve the radiation characteristics of an antenna placed in close proximity to or in the same plane as such a surface (R. Coccioli, F. Yang, K. Ma, and T. Itoh, *IEEE Trans. Microwave Theory Tech.,* **47**, 2123-2130, 1999). However, one of the main drawbacks to date of these high-impedance surfaces has been their characteristically narrowband response.

This paper investigates various approaches to developing multi-band designs for high impedance frequency selective surfaces that could be used, for instance, to enhance the performance of multi-band antennas. One of the most promising techniques that will be discussed involves using a Genetic Algorithm (GA) approach to synthesize optimal configurations for multi-band high impedance FSS. By incorporating a GA into the development process, it is possible to modify the geometry of the FSS screen as well as the dielectric constant and thickness of any substrate or superstrate material. An example of a dual-band high impedance FSS synthesized via a GA is shown below in Figure 1:

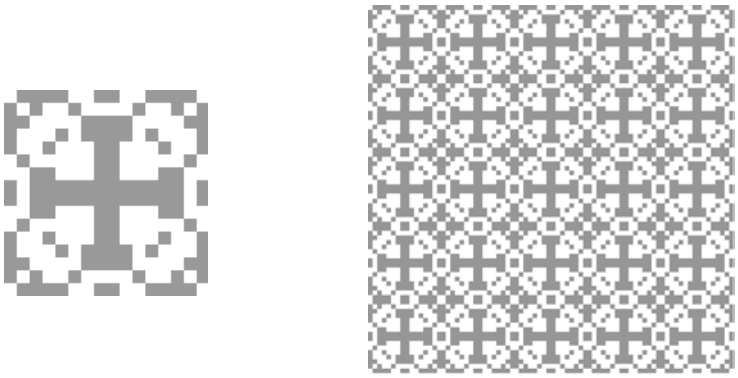

Figure 1. An Example of a Genetically Engineered Dual-band High Impedance FSS Cell and Corresponding Screen.

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