

The main objective of this work is to develop smart metamaterial surfaces for frequency control. This is achieved through the design, development and characterization of finite FSS structures. These structures combine patch geometries of varying periodicities in a checkerboard arrangement to reduce coupling and produce surfaces with dual RCS peaks at a variety of frequencies. Both dipoles and square loops are explored. Fabrication was done on a newly designed low-loss, high-contrast dielectric with $\epsilon_r = 13 - j*0.013$. Overall this work demonstrates a new class of microwave and optical reflector surfaces that allow for multi-functional and multi-beam performance embedded on conformal and possibly curved surfaces.