

A novel multi-frequency antenna optimization algorithm is presented based on rigorous electromagnetic simulations tools. This is the first time that a combination of dielectric, magnetic and metallic materials are modified volumetrically subject to multi-objective optimization criteria. The developed tools also allow the user to select a subset of practical material parameters allowing for realizable optimized designs.

Various optimized designs are presented using texturizations of only dielectric materials or combination of dielectric, metallic and magnetic materials. The optimized final designs include a very thin dielectric ($\sim 0.01\lambda$) bow-tie and a single layer CP patch with as much as 15% BW. A multilayer magneto-dielectric stacked patch exhibiting remarkable gain/bandwidth behavior is also presented. Specifically, metallized strips as small as 0.1λ are presented having a gain of 4.7dB and a bandwidth of 3.4%