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Progress in frequency selective surface-based smart electromagnetic structures: A critical review

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Abstract

This article analyzes a review of recent developments in the field of frequency selective surface (FSS)-based advanced electromagnetic (EM) structures. FSSs have been the subject of intensive investigation for distinct EM applications for more than four decades. An FSS is a type of filter consisting of an array of periodic metallic patches or apertures on a dielectric substrate. The high-pass (inductive FSS) and low-pass (capacitive FSS) filtering operation of FSS results in the exhibition of total transmission and reflection near the resonance wavelength. **This paper deals with an overview of different FSS geometries, namely, traditional, active, fractal, three-dimensional and multilayered FSSs. A number of recent practical EM applications of FSS structures like microwave absorbers, radomes, textiles and antennas are discussed.** In addition, different types of optimization and fabrication techniques for FSS-based EM structures are incorporated. The FSS-based research directions described in this study may be of interest to the scientific community working in this particular field.

Keywords

Frequency selective surface, microwave, radome, stealth, and antenna.

1. Introduction

FSSs are generally periodic structures that are composed of conductive patches or aperture elements designed to reflect, transmit or absorb EM waves (Munk, 1995; Wu, 1995; Munk, 2000). An FSS can pass or block **the** waves of certain frequencies in free space; hence, they are also known as spatial filters in Electromagnetics. The advances in modern communication systems demands novel FSS-impacted structures to meet stringent EM requirements (Yan et al., 2014). Recently, a huge growth has been observed in the field of FSS design and analysis for different EM applications.

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