Electromagnetic Analysis of Composite-Material-Embedded Chiral Cylindrical Shells

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ABSTRACT

In this thesis, electromagnetic shielding and scattering properties of a composite-material-embedded chiral cylindrical shell impinged by a normally incident plane wave are investigated. The chiral material under consideration is isotropic and reciprocal, and is artificial in nature. The fiber-reinforced composite material is anisotropic and has many superior properties, such as sufficient hardness and light weight. The electromagnetic fields in each chiral layer are expanded in terms of appropriate cylindrical wave functions. The unknown coefficients for all chiral layers can be related in a recursive manner. The fields in composite material can be solved using a finite-difference approach. After enforcing the boundary conditions at the interfaces between the chiral material and the composite material, the scattering and shielding characteristics can be obtained. Numerical computations on echo widths and shielding effectivenesses for various structural parameters have been carried out.

Keywords : chiral material ; composite material ; echo width ; shielding effectiveness

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