

Scattering Characteristics of Stratified Double Negative Stacks Using the Frequency Dispersive Cold Plasma Medium

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We present the wave propagation through stratified double negative stacks to illustrate the scattering characteristics of their structure. The double negative stacks are modeled by using the hypothetical non-dispersive and the frequency dispersive cold plasma media. The stacks are embedded between two double positive media and the incident electric field is assumed a plane electromagnetic wave with any arbitrary polarization. By imposing the boundary conditions, the relations between the fields inside and outside the stacks can be written in a matrix form. Using this transfer matrix, the incident, reflected, and transmitted powers are derived. The variations of the powers for the stratified double negative stacks using the frequency dispersive cold plasma medium have not been investigated yet, in detail. Thus, their characteristics for the perpendicular polarization is computed and presented in numerical results with the emphasis on the plasma frequencies. It is seen from the numerical results that the stratified double negative stacks can be used as electromagnetic filters at some frequency bands.

Key words: Double Negative Medium; Cold Plasma; Frequency Dispersive; Reflection and Transmission; Propagation.