

Radiation and scattering by a multilayer uniaxial bianisotropic circular cylindrical scatterer

Abstract

The eigenfunction solution of electromagnetic radiation and scattering from a multilayer uniaxial bianisotropic circular cylindrical scatterer is presented. The expressions for the electric and magnetic field equations are decomposed into transverse and longitudinal components. The boundary conditions are enforced by matching the transverse and axially directed fields at the interfaces between regions with different constitutive parameters. Matrices are constructed from the linear algebraic equations to solve the unknown series coefficients. On the one hand, numerical results are presented for the near zone fields and radar cross section in the two dimensional case. On the other hand, numerical solutions are presented for the radiation pattern when a dipole is present in the vicinity of the cylindrical scatterer in the three dimensional case. Results obtained using the eigenfunction series for the multilayer uniaxial bianisotropic circular cylindrical scatterer are in excellent agreement with results in existing literature and solutions computed using other formulations.

Keywords

Cylinders (shapes); Eigenvalues and eigenfunctions; Linear equations; Matrix algebra; Multilayers