A New Solution for Diffraction by an Anisotropic Impedance Half Plane at Oblique Incidence

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A problem of continuing interest is the diffraction of a plane electromagnetic wave at oblique (skew) incidence on a half plane subject to anisotropic impedance boundary conditions at its faces. When Maliuzhinets' method is employed, linear combinations of the spectra representing the *z* components of the total electric and magnetic fields satisfy second order difference equations. When the impedances are the same on both faces, an approximate solution was obtained by Senior and Legault (*Electromagnetics*, **18**, 207-225, 1998) that appeared to produce expressions for the total fields that are reasonably accurate for all angles of incidence. However, on closer study it is found that the coefficients of reflection off the lower surface agree with their optics values only for normal incidence, showing that the method is flawed. The error can be traced to a connection between the spectra that is forced by the boundary conditions at the lower face and that no longer permits the normalization that was carried out to produce the incident field.

The correction for the error is not trivial but can be performed. The revised solution is presented and it is verified that it now produces the correct reflection coefficients and is in agreement with the known exact solutions for normal incidence and for an isotropic half plane at all angles of incidence. Numerical data are given for specimen impedances and a variety of incidence angles.

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(1) URSI Commission B: em theory/diffraction
(2) New solution
(3) Correction of published results