SCATTERING BY A THICK PERFECTLY CONDUCTING EDGE AND STRIP

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As an alternative to the Wiener-Hopf technique (S. W. Lee and R. Mittra, IEEE Trans. AP-16, 454-461, 1967), the angular spectrum method (P. C. Clemmow, Proc. Roy. Soc. 205A, 286-308, 1951) is employed to solve the problem of a plane wave incident on a thick perfectly conducting edge. Both polarizations are considered, and in contrast to the Wiener-Hopf technique, the method leads to a relatively simple derivation of equations for the surface current spectra. These are solved to give explicit expressions for the field diffracted by the edge as well as for the coupling, launching and reflection coefficients associated with each mode. The relative simplicity of the angular spectrum method gives hope that other geometries can be treated in the same manner.

Using models designed to isolate the edge scattering, several backscattering patterns have been measured for a thick edge and a step on a ground plane. These were found to be in good agreement with the theoretical results. In addition, calculations based on a self-consistent GTD analysis applicable to thicker edges (more than a half wavelength in thickness) are presented. The combination of the angular spectrum and GTD results then provides an efficient method for treating edges of arbitrary thickness. These same techniques are also applicable to thick strips and to steps in a ground plane.

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