Scattering by Two Parallel Metallic Half-planes Perpendicularly Truncated by a Metal Plane

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The metallic structure under consideration consists of two parallel half-planes whose edges are parallel to each other and located at a minimal distance from each other, truncated by a metallic plane perpendicular to the edges. The primary field is an obliquely incident and arbitrarily polarized plane wave. The boundary-value problem is solved exactly in the phasor domain, with a time-dependent factor $exp(+j\omega t)$ that is omitted throughout.

The solution is obtained in three steps. In the first step, a plane wave incident normally to the edges of the half-planes in the absence of the truncating plane is considered. The solution to this problem (B. Noble, *Methods Based on the Wiener-Hopf Technique for the Solution of Partial differential Equations*, Belfast: Pergamon Press, 1958) is written explicitly in terms of the electric and magnetic fields everywhere. In the second step, the solution is extended to the case of oblique incidence of the primary wave by utilizing a technique for going from two-dimensional to three-dimensional scattering and finally, in the third step, the introduction of the truncating plane is dealt with via the method of images. These three steps follow the general procedure developed by Uslenghi (*IEEE Trans. Antennas Propag.*, vol. 63, no. 5, pp. 2228-2236, May 2015) where, among other examples, the case of a truncated single half-plane was solved.

In particular, exact formulas for the surface electric current density on the structure are given and discussed. The behavior of the fields near the edge singularities is examined in detail.