Scattering by a Groove in a Conducting Plane—A PO-MoM Hybrid Formulation and Wavelet Analysis

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***Abstract*—A novel method is presented to solve the two-dimensional (2-D) problem of scattering of an electromagnetic plane wave by a groove in a perfectly conducting infinite plane. In this method, the unknown induced current is expressed in terms of the known physical optics solution of the unperturbed problem of scattering by an infinite conducting plane plus a yet to be determined localized correction current placed in the vicinity of the groove. It is then shown that a good approximation of the induced current can be obtained using only a few dominant functions in the wavelet expansion of the correction current. Moreover, the same set of dominant wavelet functions serves the purpose of approximating the induced current at different angles of incidence. A numerical example demonstrates these various features of the proposed method of solution.**

we show that the use of a small set, comprising the dominant wavelet functions in the expansion of the correction current at a certain incident angle, yields a satisfactory approximation of the induced current for all angles of incidence. Thus, it is possible to span the correction current for all the angles of incidence with the same a priori known small set of wavelet functions.

The paper is organized as follows. In Section II, we formulate the problem and the proposed method of solution. Numerical results that demonstrate the features of this method are illustrated in Section III. It is then shown in Section IV that wavelet functions in the proposed MoM procedure can offer savings in computational resources. Finally, summary and conclusions are