

## Closed-Form Green's Functions for General Sources and Stratified Media

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The closed-form Green's functions of the vector and scalar potentials in the spatial domain are presented for the sources of horizontal electric, magnetic, and vertical electric, magnetic dipoles embedded in general, multilayer, planar media. First, the spectral domain Green's functions in an arbitrary layer are derived analytically from the Green's functions in the source layer by using a recursive algorithm. Then, the spatial domain Green's functions are obtained by adding the contributions of the direct terms, surface waves, and complex images approximated by the Generalized Pencil of Functions Method (GPOF). In the derivations, the main emphasis is to put these closed-form representations in a suitable form for the solution of the mixed potential integral equation (MPIE) by the method of moments in a general three-dimensional geometry. The contributions of this paper are: 1) providing the complete set of closed-form Green's functions in spectral and spatial domains for general stratified media; 2) using the GPOF method, which is more robust and less noise sensitive, in the derivation of the closed-form spatial domain Green's functions; and 3) casting the closed-form Green's functions in a form to provide efficient applications of the method of moments.

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