Abstracts

Dyadic Green's Functions for Conductor-Backed Layered Structures Excited by Arbitrary Tridimensional Sources

P. Bernardi and R. Cicchetti. "Dyadic Green's Functions for Conductor-Backed Layered Structures Excited by Arbitrary Tridimensional Sources." 1994 Transactions on Microwave Theory and Techniques 42.8 (Aug. 1994 [T-MTT]): 1474-1483.

A general procedure for the evaluation of the dyadic Green's functions for arbitrarily oriented electric- and magnetic-current point sources embedded in a conductor-backed layered medium is presented. In the proposed approach a suitable integro-differential vectorial basis is used to split the inhomogeneous Maxwell equations, written in a transversely-invariant form, into the TE and TM wave equations. In the spectral domain (Fourier transformed domain) these equations are reduced to the usual transmission-line like equations which are solved by means of a set of auxiliary scalar Green's functions. These functions are used to express the dyadic Green's functions in the spectral as well as in the space domain. The expressions obtained contain explicit dyadic delta terms which are required to represent the electromagnetic field in the entire space including the source regions. The general theory is used to show that in the low-frequency range the electromagnetic field can be approximated by means of a TM (with respect to the interfaces normal) wave. In this manner an asymptotic form for the dynamic characteristic impedance for a microstrip line is obtained. Finally, in order to show the feasibility of the method, some comparisons with previous results concerning the electrical characteristics of a microstrip line are carried out.

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