Abstracts

Input Impedance of a Probe-Excited Semi-Infinite Rectangular Waveguide with Arbitrary Multilayered Loads: Part I--Dyadic Green's Functions

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Part I of this paper presents both the electric and the magnetic types of dyadic Green's functions defined for electromagnetic fields due to electric and magnetic current sources in a semi-infinite rectangular waveguide filled with arbitrary multi-layered media. Applying the principle of scattering superposition, the dyadic Green's functions in each of the multiple loads are constructed in general for such EM current sources located in an arbitrary layer of the waveguide. Analytical expressions of the scattering dyadic Green's functions' coefficients are obtained in terms of transmission matrices. To demonstrate how the method presented is used and how the results are obtained for some special cases, a semi-infinite rectangular waveguide with one load is considered. The dyadic Green's functions and their coefficients in such a case are derived in closed form by reducing the general formulae of the dyadic Green's functions for the arbitrary multiple case to those for the special case concerned. Further comparison of the dyadic Green's functions obtained here with previous publications shows good agreement, demonstrating the applicability of the results presented here. Part II of this paper will present a full-wave numerical analysis of a probe with both electric and magnetic current distributions.

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