Abstracts

Scalarization of Dyadic Spectral Green's Functions and Network Formalism for Three-Dimensional Full-Wave Analysis of Planar Lines and Antennas

S.-G. Pan and I. Wolff. "Scalarization of Dyadic Spectral Green's Functions and Network Formalism for Three-Dimensional Full-Wave Analysis of Planar Lines and Antennas." 1994 Transactions on Microwave Theory and Techniques 42.11 (Nov. 1994 [T-MTT]): 2118-2127.

A novel and systematic method is presented for the complete determination of dyadic spectral Green's functions directly from Maxwell's equations. With the use of generalized scalarizations developed in this paper, four general and concise expressions for the spectral Green's functions for one-dimensionally inhomogeneous multilayer structures, excited by three-dimensional electric and magnetic current sources, are given in terms of modal amplitudes together with appropriate explicit singular terms at the source region. It is shown that Maxwell's equations in spectral-domain can be reduced, by using dyadic spectral eigenfunctions, to two sets of z-dependent inhomogeneous transmission-line equations for the modal amplitudes. One set of the transmission-line equations are due to the transverse current sources and the other set due to the vertical current sources. Utilizing these equations, network schematizations of the excitation, transmission and reflection processes of three-dimensional electromagnetic waves in one-dimensionally inhomogeneous multilayer structures are achieved in a full-wave manner. The determination of the spectral Green's functions becomes so simple that it is accomplished by the investigation of voltages and currents on the derived equivalent circuits. Examples of single- and multilayer structures are used to validate the general expressions and the equivalent circuits.

❑ Return to main document.