Abstracts

An Integral Equation Method for the Evaluation of Conductor and Dielectric Losses in High-Frequency Interconnects

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An integral equation method is developed to solve for the complex propagation constant in multilayer planar structures with an arbitrary number of strip conductors on different levels. Both dielectric losses in the substrate layers and conductor losses in the strips and ground plane are considered. The Green's function included in the integral equation is derived by using a generalized impedance boundary formulation. The microstrip ohmic losses are evaluated by using an equivalent frequency-dependent impedance surface which is derived by solving for the fields inside the conductors. This impedance surface replaces the conducting strips and takes into account the thickness and skin effect of the strips at high frequencies. The effects of various parameters such as frequency, thickness of the lines, and substrate surface roughness on the complex propagation constant are investigated. Results are presented for single strips, coupled lines, and two-level interconnects. Good agreement with available literature data is shown.

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