Abstracts

Application of Spectral Domain Prony's Method to the FDTD Analysis of Planar Microstrip Circuits

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Residual reflection from absorbing boundaries that truncate the computational mesh in the finite-difference time-domain (FDTD) method introduces significant error in the characterization of transmission lines and discontinuities employed in microwave and millimeter-wave integrated circuits. We apply the least squares Prony's method to accurately estimate the complex reflection coefficient (at Mur's absorbing boundary) in the frequency domain by representing the sampled voltages along a microstrip transmission line as a plane wave superposition of incoming and outgoing transverse electromagnetic (TEM) waves at each reference port. Prony's method is used to compute the frequency-dependent effective dielectric constant of a microstrip line and the scattering parameters of microstrip circuit elements, which corroborate well with published and measured results. A new method is discussed to reduce the computer memory required to store the temporal samples which are employed in the spectral processing of the FDTD data.

❑ Return to main document.