Abstracts

A hybrid full-wave analysis of via-hole grounds using finite-difference and finite-element time-domain methods

Dongsoo Koh, Hong-bae Lee and T. Itoh. "A hybrid full-wave analysis of via-hole grounds using finite-difference and finite-element time-domain methods." 1997 Transactions on Microwave Theory and Techniques 45.12 (Dec. 1997, Part II [T-MTT] (1997 Symposium Issue)): 2217-2223.

A hybrid full-wave analysis using finite-difference time-domain (FDTD) and finite-element time-domain (FETD) methods is developed to analyze locally arbitrarily shaped microwave structures. This hybrid method employs the standard FDTD method with super-absorbing Mur's first-order absorbing-boundary condition (ABC) and the FETD method using the second-order vector prism elements. An interpolation scheme is proposed for communicating between the FDTD and FETD fields, which will not require the effort of fitting the FETD mesh to the FDTD cells in the interface region. This method is applied to calculate the scattering parameters of single and multiple cylindrical via holes in a microstrip structure. Applying FETD to the via-hole grounds and FDTD to the remaining region preserves the advantages of both FETD flexibility and FDTD efficiency. A comparison of the results with the mode-matching data and the FDTD staircasing data verifies the accuracy of the proposed method.

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