Abstracts

Accurate frequency-domain modeling and efficient circuit simulation of high-speed packaging interconnects

W.T. Beyene and J.E. Schutt-Aine. "Accurate frequency-domain modeling and efficient circuit simulation of high-speed packaging interconnects." 1997 Transactions on Microwave Theory and Techniques 45.10 (Oct. 1997, Part II [T-MTT] (Special Issue on Interconnects and Packaging)): 1941-1947.

The paper describes an efficient frequency-domain modeling and simulation method of a coupled interconnect system using scattering parameters. First, low-order rational approximations of the multiport scattering parameters are derived over a wide frequency range using a robust interpolation technique. The method applies frequency normalization, shift, and Householder QR orthogonalization to improve the stability and the accuracy when solving the resulting systems of equations. For interconnects characterized with frequency-dependent parasitic parameters, the order of the rational of approximation is reduced by using appropriate reference system. Then, the generated multiport pole-residue models are incorporated into a circuit simulator using recursive convolution. Thus, the method avoids explicit convolution, numerical transform, and artificial filtering of a large number of points that are often necessary in conventional approaches. Examples with experimental and simulated results are given to illustrate the method.

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