Abstracts

A Fast Method for Frequency and Time Domain Simulation of High-Speed VLSI Interconnects

R. Sanaie, E. Chiprout, M.S. Nakhla and Q.-J. Zhang. "A Fast Method for Frequency and Time Domain Simulation of High-Speed VLSI Interconnects." 1994 Transactions on Microwave Theory and Techniques 42.12 (Dec. 1994, Part II [T-MTT] (1994 Symposium Issue)): 2562-2571.

Moment matching techniques have been proposed recently for the fast analysis of large linear lumped and distributed VLSI interconnect networks which can include lossy coupled transmission line models. Specifically, complex frequency hopping (CFH) has been applied to generate the actual dominant poles of a network up to any predestined highest frequency of interest. This paper introduces a method, within the context of CFH, which allows the incorporation of subnetworks characterized by measured data in a moment-matching simulation. For this purpose, a novel frequency analysis algorithm is proposed that enables the analysis of a network's frequency response without solving the network at every frequency point and without calculating the poles of the network. Instead, it relies on a technique of generating an approximating transfer function at a minimized number of frequency points. The proposed algorithm requires the solution of the network equations at fewer frequency points compared to a pole searching algorithm for the same accuracy level. The method enables a speedup of 20-100 times compared to conventional frequency analysis techniques of interconnect networks. Several examples are presented which demonstrate the accuracy and efficiency of the proposed technique.

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