Abstracts

A Frequency Domain Approach to Performance Optimization of High-Speed VLSI Interconnects

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An efficient method is presented for the computation of exact group delay, gain slope and their sensitivities with respect to design parameters in multi-conductor transmission line networks. The group delay and gain slope sensitivities with respect to transmission line parameters are evaluated in terms of the second-order derivatives of the eigenvalues and eigenvectors of the propagation matrix. By combining this method with minimax optimization, a frequency-domain approach is developed to minimize transient delay and distortion in high-speed VLSI interconnects. Examples of interconnect optimization demonstrate simultaneous reductions of signal propagation delay, distortion and crosstalk at several vital connection ports. Compared to direct time domain optimization, the proposed approach is more than three times faster. The proposed technique is useful in optimal design of circuit interconnects for high-speed digital computers and communication systems.

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