Abstracts

Analysis of Crosstalk in Very High-Speed LSI/VLSI's Using a Coupled Multiconductor MIS Microstrip Line Model

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Crosstalk in very high-speed LSI/VLSI's is analyzed using a coupled multiconductor metal-insulator-semiconductor (MIS) microstrip line model. Loss in the substrate is ignored for simplicity. A periodic boundary condition is used, and the mode analysis is done using the Green's function method. Effects of line length spacing, substrate thickness, and output impedance of gates are investigated. The "lumped capacitance" approximation for interconnections is shown to be inadequate for crosstalk evaluation when the circuit speed is less than 200-300 ps in LSI circuits. The result indicates that crosstalk considerations based on a transmission-line model is very important in the design of very high-speed LSI/VLSI circuits, Provisions of adjacent shield lines are shown to be significantly effective in reducing crosstalk but at the risk of dynamic ringing and at the sacrifice of wiring capacity. A shielded multilevel interconnect scheme is proposed for reduction of crosstalk without reduction of wiring capacity.

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