Abstracts

Time-domain modeling of high-speed interconnects by modified method of characteristics

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In this paper, a new model of lossy transmission lines is presented for the time-domain simulation of high-speed interconnects. This model is based on the modified method of characteristics (MMC). The characteristic functions are first approximated by applying lower order Taylor series in the frequency domain, and then a set of simple recursive formulas are obtained in the time domain. The formulas, which involve tracking performances between two ends of a transmission line, are similar to those derived by the method of characteristics for lossless and undistorted lossy transmission lines. The algorithm, based on the proposed MMC model, can efficiently evaluate transient responses of high-speed interconnects. It only uses the quantities at two ends of the lines, requiring less computation time and less memory space than required by other methods. Examples indicate that the new method has high accuracy and is very efficient for the time-domain simulation of interconnects in high-speed integrated circuits.

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