Abstracts

Passive closed-form transmission-line model for general-purpose circuit simulators

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A passive closed-form model for multiconductor lossy transmission line analysis is presented in this paper. The proposed model is suitable for inclusion in general-purpose circuit simulators and overcomes the mixed frequency/time simulation difficulties encountered during the transient analysis. In addition, the model can handle frequency-dependent line parameters. This method offers an efficient means to discretize transmission lines compared to the conventional lumped discretization, while preserving the passivity of the discrete model. Coefficients describing the discrete model are computed a priori and analytically, using closed-form Pade approximants of exponential matrices. Numerical examples are presented to demonstrate the validity of the proposed model and to illustrate its application to a variety of interconnect structures.

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