Abstracts

Simulation of Dispersive Multiconductor Transmission Lines by Pade Approximation via the Lanczos Process

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A mathematical model for dispersive, multiconductor transmission lines is introduced that makes possible the utilization of the Pade approximation via the Lanczos (PVL) process to the analysis of linear networks that contain transmission line systems. The mathematical model is based on the use of Chebyshev polynomials for the representation of the spatial variation of the transmission-line voltages and currents. A simple collocation procedure is used to obtain a matrix representation of the transmission line equations with matrix coefficients that are first order polynomials in the Laplace-transform variables and in which terminal transmission-line voltages and currents appear explicitly. Thus, the model is compatible with both the PVL algorithm and the modified nodal analysis formalism. Results from the numerical simulation of both digital interconnect-type and microwave circuits are presented to demonstrate the validity and discuss the efficiency of the proposed model.

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