Abstracts

Scattering Parameter Transient Analysis of Transmission Lines Loaded with Nonlinear Terminations

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This work presents a new approach for the time-domain simulation of transients on a dispersive and lossy transmission line terminated with active devices. The method combines the scattering matrix of an arbitrary line and the nonlinear causal impedance functions at the loads to derive expressions for the signals at the near and far ends. The problems of line losses, dispersion, and nonlinearities are first investigated. A time-domain formulation is then proposed using the scattering matrix representation. The algorithm assumes that dispersion and loss models for the transmission lines are available and that the frequency dependence is known. Large-signal equivalent circuits for the terminations are assumed to be given. Experimental and computer-simulated results are compared for the lossless dispersionless case, and the effects of losses and dispersion are predicted.

❑ Return to main document.