Abstracts

On the Realization of Resistively Matched Three-Ports and the Ramp-Waveform Responses of Resistive, Signal-Split Three-Port Transmission-Line Networks

Three-port networks consisting of three transmission lines and three branching resistors at a junction, for the conditions of TEM wave propagation and lossless lines, are discussed. This discussion entails the following: 1) The matching conditions for the resistive three-port are modeled by scattering matrices. 2) As transmission lines of unequal length are used, the network transfer functions are derived for three different delay variables. These functions are obtained in a matrix form after their expansions with respect to these variables are derived. As a consequence, output waveforms can be calculated from the network transfer functions or their expansions. This method of expansion is superior to the conventionally used lattice diagram for analyzing high-speed logic circuits and designing their interconnections. 3) Three characteristics of output waveforms are discussed. 4) Ideal networks that furnish the same output waveforms as their inputs and practical networks that have parameters as close as possible to the ideal are described. 5) Examples of networks that keep the ringing of output waveforms within given tolerances, from the first arriving wave to the steady state, are presented. 6) Finally, this paper concludes with a discussion of power dissipation.

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