Abstracts

Equivalent Circuit Modeling of Losses and Dispersion in Single and Coupled Lines for Microwave and Millimeter-Wave Integrated Circuits

V.K. Tripathi and A. Hill. "Equivalent Circuit Modeling of Losses and Dispersion in Single and Coupled Lines for Microwave and Millimeter-Wave Integrated Circuits." 1988 Transactions on Microwave Theory and Techniques 36.2 (Feb. 1988 [T-MTT] (Special Issue on Computer-Aided Design)): 256-262.

Losses and dispersion in open inhomogeneous guided wave structures such as microstrips and other planar structures at microwave and millimeter-wave frequencies and in MMIC's have been modeled with circuits consisting of ideal lumped elements and lossless TEM lines. It is shown that, given a propagation structure for which numerical techniques to compute the propagation characteristics are available, an equivalent circuit whose terminal frequency and time-domain properties are the same as the structure can be synthesized. This is accomplished by equating the network functions of the given single or coupled line multiport with that of the model and extracting all the parameters of the equivalent circuit model by using standard parameter identification procedures. This equivalent circuit is valid over a desired frequency range and represents a circuit model which can be used to help design both analog and digital circuits consisting of these structures and other active and passive elements by utilizing standard CAD programs such as SPICE. In order to validate the accuracy and usefulness of the models, results for a mismatched 50-Omega line in alumina and a high-impedance MMIC line stub are included. In addition, for the case of coupled lines the results for a nominal 50-Omega, 10 dB coupler on alumina obtained by using the circuit model on SPICE are compared with rigorously computed values of the scattering parameters for the lossy dispersive system.

❑ Return to main document.