The Distortion and Crosstalk of Wideband Pulse Waves Propagating in Some Cylindrical Coplanar Waveguides and Microstrip Lines

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Abstract: Coplanar waveguides (CPWs) have been widely used in radio frequency and monolithic microwave integrated circuits (RF(MM)ICs), due to their several advantages over conventional microstrip. Further, picosecond pulse propagation in some planar CPWs has been examined by some researchers in the past a few years, and the coupling among neighboring strips can be effectively reduced by optimizing the structure parameters of the CPWs. On the other hand, the dispersion characteristics of various cylindrical CPWs and microstrip lines have been studied by some researchers. Among these one should mention the work done by Wong *et al*, where the effective permittivity of the dominant mode and the characteristic impedance of different structures have been examined symmetrically using the Galerkin's method (R. B. Tsai, and K. L. Wong, *IEEE Trans. MTT*, 43, 1607-1610, 1995; H. S. Su and K. L. Wong, *IEEE Trans. MTT*, **44**, 2120-2122, 1996). These types of waveguide structures have some unique features and can meet certain requirements in advanced antennas and monolithic microwave integrated circuit designs.

In this work, we are focused on the propagation of wideband pulse waves propagating in some cylindrical coplanar waveguides and microstrip lines. The mathematical treatment is based on the Galerkin's method in the spectral domain and the fast Fourier transformation (FFT). Parametric studies are performed to show the hybrid effects of geometrical and material parameters on the pulse wave distortion and crosstalk (Fig. 1).

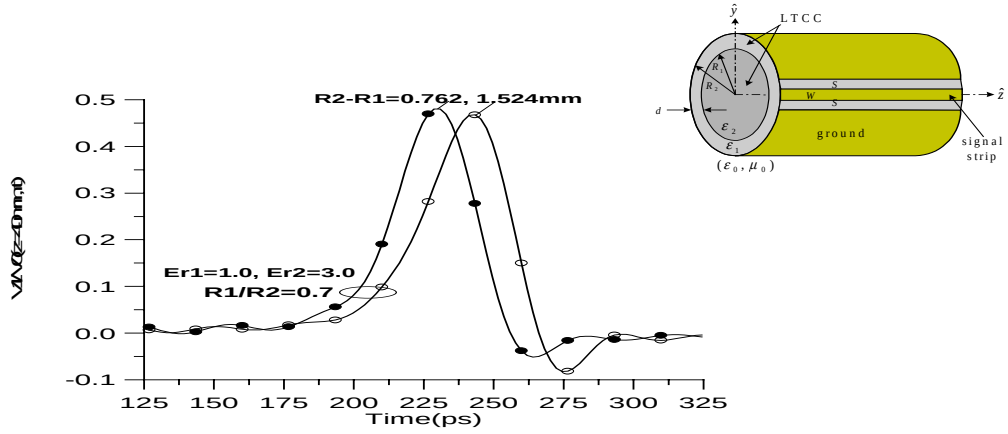

Figure 1. The Gaussian pulse wave response of a cylindrical CPW.