Abstracts

Propagation Modes, Equivalent Circuits, and Characteristic Terminations for Multiconductor Transmission Lines with Inhomogeneous Dielectrics

The theory of wave propagation on lossless multiconductor transmission lines with inhomogeneous dielectrics is developed using matrix analysis. The treatment is concise and complete and has the advantage of identifying propagation modes in a way that permits straightforward physical interpretation. The equivalent circuit for the general line is derived and its application to the solution of wave problems with reflections is demonstrated. Special consideration is given to the problem of characteristically terminating a multiconductor line, i.e., terminating without reflections. The realizability of such a characteristic termination network is discussed, and proofs of realizability are given for the important cases of all lines with homogeneous dielectrics and all three-conductor lines, regardless of dielectric inhomogeneities. Symmetric three-conductor lines are discussed to exemplify the general theory, and an application to the problem of mode conversion on symmetric and asymmetric shielded strip lines is given.

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