Abstracts

A Network Model for Transmission Lines with Gyromagnetic Coupling

Reciprocal ensembles of coupled transmission lines have been studied for many years using matrix techniques. In this paper, the lossless multiconductor transmission line model is extended to permit a description of gyromagnetic coupling effects. The novel ingredient which allows such an extension is the incorporation of distributed gyrators into the elemental line-length prototype. These gyrators provide antireciprocal coupling between the ensemble conductors. The amount of coupling is expressed by a geometry-dependent factor which in effect measures a given structure relative to an ideal Faraday rotator in the same medium. The gyromagnetic coupling factor, in conjunction with the derived expressions for mode propagation factors and characteristic impedances, provides a means of interpolating between the known limits of no coupling and ideal Faraday rotation. General relations are derived for two-line systems and for symmetrical, quasi-TEM three-line systems.

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