Abstracts

CAD-Oriented General Circuit Description of Uniform Coupled Lossy Dispersive Waveguide Structures

A general full-wave circuit description of uniform coupled lossy dispersive waveguide structures is presented. Starting from Maxwell's equations, the generalized coupled telegrapher's equations are directly found and the frequency dependent line parameter matrices $R(\omega)$, $G(\omega)$, $L(\omega)$ and $C(\omega)$ are defined in an unambiguous way. A new symmetric high-frequency characteristic impedance matrix $Z_c(\omega)$ is introduced which is much more suited for circuit simulation purposes than the traditional line-mode impedances. The reciprocity relation is explicitly taken into account. The complete power distribution over the different modes and different lines are calculated in a rigorous and concise way. The major advantage of this high-frequency model is its simple circuit-interpretation and its compatibility with the well-known quasi-static circuit models. The matrix formalism is used throughout this paper. This guarantees a compact, easily implementable and very general description which is well suited for CAD applications.

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