Abstracts

Phenomenological Loss Equivalence Method for Planar Quasi-TEM Transmission Lines with a Thin Normal Conductor or Superconductor

The incremental inductance rule for conductor loss calculations is not valid if conductor thickness decreases and becomes comparable to the penetration depth, such as in monolithic microwave integrated circuits. In this paper, a simple approach, referred to as the phenomenological loss equivalence method, is proposed for characterizing a planar quasi-TEM transmission line with a thin normal conductor or superconductor over a wide range of field penetrations. For microstrip lines with a thin copper or high-T_c superconductor, the conductor losses calculated by this method agree very well with the published data calculated by the finite element method and the Monte Carlo method, respectively. Because of the simplicity of the calculation, this method should be very useful for the computer-aided design of monolithic microwave circuits.

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