Abstracts

Modeling of Planar Quasi-Tem Superconducting Transmission Lines

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Design oriented modeling of high-temperature superconducting thin-film microwave circuits is difficult when film thickness is of the order of the penetration depth of the fields. Involved formulas for loss, phase velocity and characteristic impedance can be derived from the Bardeen-Cooper-Schrieffer (BCS) theory of superconductivity. The parameters required by these formulas do not correspond to "readily measurable" observable that depend on the manufacturing process of the superconductor. In this paper an application of the phenomenological loss equivalence method in modeling the microwave behavior of planar quasi-TEM superconducting transmission lines is presented. Measured and modeled S-parameters of an existing superconducting coplanar waveguide lowpass filter agree to within 0.3 dB in magnitude and 0.5 radians in phase. Extracted values for penetration depth and real part of the conductivity of the superconducting film are within 10% of the findings of other researchers.

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