Abstracts

Empirical model of the microwave properties of high-temperature superconductors

O.G. Vendik, I.B. Vendik and D.I. Kaparkov. "Empirical model of the microwave properties of high-temperature superconductors." 1998 Transactions on Microwave Theory and Techniques 46.5 (May 1998, Part I [T-MTT]): 469-478.

This paper presents simple correct models of high-temperature superconductor (HTS) film parameters at microwave frequencies. The models are based on the enhanced two-fluid model of a superconductor. The quasi-particle scattering and peculiarities of the normal conductivity of the HTS at microwaves, including residual resistance of a material, are taken into account. The difference between the known Gorter and Casimir two-fluid model of low-temperature superconductor and the enhanced two-fluid model of HTS is proven. A simple quasi-static model of current distribution across the microstrip line and coplanar waveguide is used for a simulation of a contribution of the superconductor transport processes into impedance per unit length of the transmission lines considered. The models developed were applied to a simulation of microstrip line and coplanar waveguide resonators. Good agreement of simulated results and measurements in a wide temperature range has been demonstrated. The model presented can be considered as a starting point for the formation of the computer-aided design (CAD) package of HTS microwave components.

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