Abstracts

Numerical computation of the interaction between electromagnetic waves and nonlinear superconducting materials

S. Caorsi, A. Massa and M. Pastorino. "Numerical computation of the interaction between electromagnetic waves and nonlinear superconducting materials." 2001 Transactions on Microwave Theory and Techniques 49.10 (Oct. 2001, Part I [T-MTT] (Mini-Special Issue on Electrical Performance of Electronic Packaging (EPEP))): 1810-1817.

In this paper, we propose a numerical solution to the computation of the interaction between electromagnetic waves and superconducting materials. A superconductor is identified as a material with a negative dielectric permittivity on the basis of the two-fluid model and an integral-equation formulation is developed. The approach takes into account the nonlinear behavior (i.e., the dependence of the material parameters on the internal magnetic field), experimentally observed in previous studies. An iterative process is then developed for the numerical solution; the process is based on the distorted-wave Born approximation. The mathematical formulation of the approach is described and some numerical results concerning the canonical case of a circular cylinder and the behavior of two superconducting transmission lines are reported.

❑ Return to main document.