

TERAHERTZ INTRINSIC AND EFFECTIVE SURFACE IMPEDANCES OF HIGH-TEMPERATURE SUPERCONDUCTING THIN FILMS

W.-H. Lin, C.-J. Wu, 楊宗哲, S.-J. Chang

Electrical Engineering

Engineering

yangtj@chu.edu.tw

Abstract

Terahertz wave properties of high-temperature superconducting thin films are theoretically investigated based on the calculated surface impedances. The surface impedances for three model structures are considered in this work. We first treat the intrinsic bulk surface impedance for a superconductor occupying the half space. Second, the intrinsic film surface impedance of a superconducting film of finite thickness is calculated. Third, we calculate the effective surface impedance for a superconductor-dielectric layered structure, i.e., a superconducting film on the dielectric substrate of finite thickness. All calculations that will be made are based on the two-fluid model of superconductors together with the transmission line theory.

Keyword : Terahertz wave, high temperature superconductor thin film, surface impedance, two-fluid model, transmission line theory