

Abstract Submitted
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A Time-Domain Susceptibility Model for a BCS Superconductor in FDTD Calculations¹ G.L. CARR, XIAOXIANG XI, Photon Sciences, Brookhaven National Laboratory, - COLLABORATION — We have developed a simple time-domain electric susceptibility model for a BCS type superconductor, valid for the spectral range spanning the optical energy gap frequency $\hbar\omega \sim 2\Delta$ and $T \ll T_C$. The expression can be used in Finite Difference Time Domain (FDTD) calculations for propagating electromagnetic waves through systems containing superconductor materials, including meta-materials. Since the energy gap appears explicitly, it can be varied as a function of time to describe non-linear and non-equilibrium effects as observed in microwave experiments. We use the expression in a FDTD calculation for the transmission through and reflection from a thin film of NbN on a substrate, and compare with both conventional frequency domain calculations as well as actual experimental results.

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