

Analysis of dependence of resonance tunneling on static positive parameters in a single-negative bilayer

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Abstract

It is known that electromagnetic resonant tunneling phenomenon can be found in the single-negative(SNG) bilayer, a two-layer coating made of the epsilon-negative(ENG) and the mu-negative (MNG) media. In this work, we report that this resonant tunneling is strongly dependent on the static positive parameters in SNG materials. The values of the static permeability in ENG layer and the static permittivity in MNG layer for obtaining the resonant tunneling are theoretically analyzed and discussed for two possible cases of two equal- and unequal- thicknesses. Useful design guidelines in selecting positive parameters for the resonant tunneling are obtained. We also investigate the possible influence in the resonant tunneling due to losses from the ENG and MNG materials. Additionally, we examine the polarization-dependent resonant tunneling, that is, the dependence of angle of incident is examined.

Keyword : Resonant tunneling, Epsilon-negative, Mu-negative, Static positive permeability, Static positive permittivity.