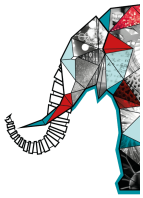
25e Congrès Général de la Société Française de Physique



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Quasi-confined ENZ mode in an anisotropic uniaxial thin slab

Thursday, 11 July 2019 09:15 (15 minutes)

In this communication, we present a numerical modal study of a simple slab, made of an uniaxial anisotropic material having an "epsilon-near-zero" (ENZ) dielectric function, surrounded by vacuum. We use anisotropic Drude models as toy models to study the effect of uniaxial anisotropy of type I and type II on the different electromagnetic modes of the system.

In addition to the so-called ENZ mode, studied in detail by Campione et. al [Phys. Rev. B 91, 121408(R) (2015)], the slab can support quasi-confined (QC) mode in the type I and type II anisotropy frequency ranges. We show that those modes exhibit a strong electric field enhancement, caused by the ENZ character of the dielectric function. In strong contrast with the ENZ mode, QC modes can have a strong electric field enhancement for thick slabs, with a Fabry-Perot-like electromagnetic field distribution spanning over the whole slab thickness.

This opens the way for large electric field enhancement in thick slabs with QC ENZ modes. Thick slabs also allow metamaterial designs, giving the possibility to engineer the anisotropy of the effective dielectric function, opening interesting perspectives for the control of field enhancement of the ENZ QC modes and their integration in operating devices, such as detectors, sources, or modulators.

Choix de session parallèle

5.3 SFO: Metamatériaux, plasmonique

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Session Classification: Séance Parallèle