Universidad Carlos III de Madrid

Seminario

Transmission and Resonance in Photonic Crystal Materials

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Abstract

In the last twenty years, there has been increasing scientific and technological interest in manipulating the propagation properties of light through its interaction with new materials, such as photonic crystals (PC). Typically, these are composite materials, engineered so that their dielectric properties depend periodically on the space variable. They are known also as photonic bandgap materials, a term that derives from gaps that may be present in their continuous EM propagation spectrum.

Our interest lies in the transmission properties of photonic crystal slabs, that display spatial periodicity along the slab and are finite and are possibly repetitive in the incidence direction. We describe resonant behavior and anomalous transmission and we connect this behavior with the existence of guided or leaky EM modes along the PC slab. We derive a generic formula for the description of the asymptotic behavior of the transmission coefficient versus the deviation of the incident frequency from the resonant frequency and the angle of deviation from normal incidence. To understand nonlinear behavior in a rigorous way, we introduce a nonlinear model, retaining critical features, but simplified enough that analytic calculation is possible. We are finally in the process of implementing a 3D boundary integral code for the numerical study of such PC. The code implements the fast calculation of the Green functions in a way that displays superalgebraic convergence. We give most descriptions in the talk, through fields obtained by a 2D code.

- DÍA Y HORA: **Miércoles 2 de marzo de 2011** a las **12:30**
- LUGAR: **Edificio Sabatini. Aula 2.3.B04**