基于电磁诱导透明的法诺共振特性研究

摘　要

电磁超材料是一种通过人工设计的能和电磁波产生一定响应的复合材料，并且能通过一定的排列方式而形成的等效介质。现阶段越来越多专家学者都在关注电磁超材料，它一般会选用金属材料来设计，利用超材料可以模拟电磁诱导透明等效应，其特性在慢光、光信号处理、光存储、传感器、量子开关等领域存在广泛的应用。本文研究设计了一种具有法诺特性的双间隙方形开口环（DRSS）类电磁超材料，并在文章中研究了超材料结构在太赫兹波段内所具有的电磁特性，后运用 CST STUDIO SUITE 软件对类电磁诱导透明（Electromagnetically Induced Transparency，EIT）下的法诺共振特性进行建模和数据仿真，当开口位置在中间时，透射谱在频率约 0.88THz 处激发了一个非常宽的透射谷，此时并没有法诺（Fano）共振现象，通过改变开口环的开口位置、开口大小等几何参数进行调控，从而得出具有法诺共振的特性曲线。

关键词：电磁诱导透明；法诺共振；电磁超材料

Fano resonance characteristics based on electromagnetic induced transparency

Abstract

Metamaterials are a kind of artificial structural materials that have emerged in recent years. By designing certain resonant structures, they can produce corresponding coupling to the applied electromagnetic fields, thus obtaining singular electromagnetic properties. It is characteristics have been widely used in slow light, optical signal processing, optical storage, sensors, quantum switches and other fields. In this paper designed a kind of double gap with stefano properties square split ring electromagnetic metamaterials, discussed the metamaterial double gap split ring structure in the terahertz band electromagnetic properties, and using CST STUDIO SUITE software transparent to electromagnetic induction (Electromagnetically Induced Transparency, EIT) stefano under resonance characteristic modeling and data simulation, when the open position in the middle, about 0.88 THz transmission spectrum in the frequency of inspired a very wide valley of transmission, At this time, there is no fano resonance phenomenon, and the simulation results are obtained by adjusting the opening position, opening size and other geometric parameters of the opening ring, so as to provide reference value for the study of metamaterials.

Keywords： electromagnetically induced transparency； Stefano resonance； metamaterial

目 录