

激光材料和光学元件

Compton散射对1维3元未磁化等离子体光子晶体禁带影响

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摘要:

为了研究Compton散射对1维3元未磁化等离子体光子晶体中TE波禁带影响,采用Compton散射模型和传输矩阵法,进行了理论分析和实验验证,取得了一些重要数据。结果表明,随着等离子体频率增大,左旋和右旋极化波禁带展宽比散射前减小0.09GHz,禁带主频率向高频区域移动增大0.48GHz。随着等离子体碰撞频率增大,两种极化波禁带宽度发生一定变化。随着等离子体回旋频率、填充率、光入射角和介质相对介电常数增大,左旋和右旋极化波禁带明显调谐效应。这一结果对等离子体光子晶体应用是有帮助的。

关键词: 非线性光学 禁带 传输矩阵法 等离子体光子晶体

Effect of Compton scattering on prohibited band gaps for 1-D ternary un-magnetized plasma photonic crystals

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Abstract:

In order to study the effect of Compton scattering on TE wave prohibited band gaps of 1-D ternary un-magnetized plasma photonic crystals, based on the model of Compton scattering and transfer matrix method, some important data was obtained after the theoretical analysis and experimental verification. The broadening width of prohibited band gap of the left circle polarization wave and the right circle polarization wave were decreased 0.09GHz along with the increasing of plasma frequency after Compton scattering. The movement from the central frequency area of prohibited band gap to the high frequency area was increased 0.48GHz. The change of prohibited band gaps widths of the left circle polarization wave and the right circle polarization wave happened along with the increasing of plasma collision frequency. The significant tuning effect of prohibited band gaps of the left circle polarization wave and the right circle polarization wave was induced by Compton scattering along with the increasing of plasma circle frequency, filling index, light incident angle and relative dielectric constant. The result is helpful for the application of the plasma photonic crystals.

Keywords: nonlinear optics band gap transfer matrix method plasma photonic crystal

收稿日期 2012-09-17 修回日期 2012-11-20 网络版发布日期 2013-05-27

DOI: 10.7510/jgjs.issn.1001-3806.2013.04.022

基金项目:

河南省基础与前沿技术研究基金资助项目(092300410227)

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