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论文

Compton散射对非均匀等离子体光子晶体光子带隙的影响

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摘要:

应用多光子非线性Compton散射模型和时域有限差分法,对多光子非线性Compton散射对非均匀等离子体光子晶体光子带隙特性的影响进行了研究,提出将入射和散射光作为形成光子带隙的新机制,对电磁波方程进行了修正.结果表明:与Compton散射前相比,散射使电磁波幅值衰减更快|随等离子体密度增加,透射谱禁带宽度几乎无变化,其中心频率向高频方向有明显移动,向上的峰值有较大增加,反射谱向下的峰值有明显减小|随温度增加,透射谱禁带宽明显减小,向上的峰值略有减小,透射能量有所降低|随两种介质介电系数比增加,光子禁带数增加,且带隙间距显著减小.

关键词: 等离子体光子晶体 光子带隙 时域有限差分法 多光子非线性Compton散射

Influence of Photonic Band Gap in Non- uniform Plasma Photonic Crystals Induced by Compton Scattering

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Abstract:

Using the model of the nonlinear Compton scattering and FDTD algorithm,influences on the photonic band gap characteristic of the uniform plasma photonic crystals were studied,induced by the multi-photon nonlinear Compton scattering.A new mechanism of photon band gap induced by incident light and scattered light was given out,and the electromagnetic wave equations were amended.The results show that attenuating of the electromagnetic wave peal value is faster after the Compton scattering,prohibit band gap widths of electromagnetic wave transmission chart nearly are not changed along with the increase of the plasma density,central frequencies are clearly moved to the high frequency directions,the upward crest values have bigger increase numbers,and the downward crest values of the reflected chart have bigger decrease numbers.The prohibit band gap widths of the transmission chart have clear decrease numbers along with the increases of the plasma temperature,the upward crest values have even little decrease numbers,and the transmission energy have littler decrease numbers too.The photon prohibit band gap numbers are increased along with the increases of the dielectric constant ratio value in the two mediums,and the band gap intervals are clearly decreased.

Keywords: PPCs Photonic band gap FDTD Multi-photon nonlinear Compton scattering

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