光子学报 2012, (4) 430-435 DOI: 10.3788/gzxb20124104.0430 ISSN: 1004-4213 CN: 61-1235/O4



论文

# 基于平面波展开法的二维光子晶体表面模式研究

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摘要:

采用平面波展开法研究了四种二维光子晶体结构(圆柱介质柱四方晶格、圆柱介质柱三角晶格、正方介质柱四方晶格、正方介质柱三角晶格)的带隙宽度随介质柱尺寸变化的关系.使用平面波展开法计算常规晶格和表面缺陷晶格的模式并进行结果叠加,研究了各结构的二维光子晶体在带隙宽度最大时的表面模式.结果表明,同种晶格的光子晶体带隙宽度随着介质柱的尺寸增大呈先增后减趋势,存在最大值.随着表面介质柱尺寸的增加,四种晶格表面模式曲线均呈下降趋势.四方晶格光子晶体与三角晶格相比,表面介质柱尺寸的变化范围更大,但能获取表面模式频率范围较小.

关键词: 光子晶体 平面波展开法 带隙宽度 表面模

## Surface Modes of Two-dimensional Photonic Crystal Based on Plane Wave Expansion Method

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Abstract:

The relations of band gap widths of four photonic crystal structures (square lattices of cylinder medium, triangle lattices of square medium, square lattices of square medium and triangle lattices of square medium) and the size of medium are studied by the plane wave expansion method. Then the plane wave expansion method is used to calculate the modes of normal lattices and surface defect lattices, and composite the results. The results show that the band gap width of the same photonic crystal lattice increases at first and then decreases. The maximum of band gap width is obtained. The surface mode curves of the four lattices are all declining as the size of surface medium column increase. The square lattices, comparing with the triangle lattices, could have a larger range to change the size of the surface medium column, but get a smaller surface mode range.

Keywords: Photonic crystal Plane wave expansion method Band gap width Surface mode

收稿日期 2011-11-23 修回日期 2012-01-14 网络版发布日期

DOI: 10.3788/gzxb20124104.0430

基金项目:

国家自然科学基金青年基金(No.61006051)和浙江省科技厅重大科技攻关优先主题重点项目(No.2010C11068)资助

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