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论文

光子晶体定向耦合三波长功分器

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摘要:

以二维三角晶格光子晶体为研究对象,在该光子晶体中引入两行以一行耦合介质柱为间距的平行单模线缺陷波导.通过分析和研究光子晶体波导耦合结构的耦合和解耦合特性,发现在不同频率下耦合波导的耦合长度不同.利用平面波展开法和定向耦合原理计算了在不同入射光频率下,缺陷波导间耦合波导的耦合长度,设计了一种新型超微光子晶体波导耦合型三波长功分器,实现了归一化频率分别为0.369、0.394、0.435的光波的分束效果.采用时域有限差分法验证了该功分器具有很好的功率分配效果.本文结果有助于光子晶体新型滤波器、定向耦合器、波分复用器、偏振光分束器以及光开关等光子器件的研究.

关键词: 光学器件 光子晶体 耦合波导 功分器

Photonic Crystal Three-wavelength Power Splitter Based on Directional Coupling

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Abstract:

A photonic crystal coupling structure is designed by introducing two parallel single mode defect waveguides with one row coupling rods in between them in the two-dimensional (2D) triangular lattice array. Based on the analysis of coupling and decoupling property of the coupled photonic crystal waveguides, it is known that different normalized frequencies correspond to different coupling lengths. The coupling lengths for coupled waveguides at different frequencies are calculated to design a new super-tiny photonic crystal three-wavelength power splitter by the plane wave expansion method and the principle of directional coupling. The effect of splitting the beam with normalized frequencies of 0.369, 0.394 and 0.435 are obtained. The function of the power splitter is analyzed by using finite different time domain method. The simulation results show that it has a good splitting beam effect. The result should contribute to the research over new kinds of optical filters, directional couplers, wavelength division multiplexers, polarization beam splitter, optical switches and other photonic devices.

Keywords: Optical devices Photonic crystal Coupled waveguides Power splitter

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