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发光学应用及交叉前沿

准光子晶体光纤的色散特性

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摘要： 设计了几种在较宽的通信区域色散平坦的准光子晶体光纤(PQF)，借助于全矢量有限元法，分别研究了基于双包层结构的2种准晶格光子晶体光纤的色散特性。数值模拟结果指出：对于PQF_1，通过合理选择结构的参数，在光通信窗口1.45~1.65 μm的范围内准光子晶体光纤的色散数值可以控制在-2.41±0.28 ps/(km·nm)。小幅度增大孔距，可在1.350~1.736 μm的较宽波长范围内得到一条近零平坦色散曲线，其色散值$|D|$可以控制在1 ps/(km·nm)左右，达到-0.45~0.57 ps/(km·nm)。对于PQF_2，在1.45~1.68 μm的范围内其色散值可以控制在4.795±0.355 ps/(km·nm)。

关键词： 光纤光学　平坦色散　有限元法　准光子晶体光纤(PQF)

Dispersion Property of Photonic Quasicrystal Fibers

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Abstract: Several new photonic quasicrystal fibers(PQFs) with ultra-flattened chromatic dispersion at wide range of the telecommunication-window are presented. Based on the full vectorial model, the finite element method is adopted to analyze the dispersion properties of photonic quasicrystal fiber with double-clad structure. According to the numerical simulation results of the PQF_1, the dispersion of the photonic quasicrystal fiber can be controlled within -2.41±0.28 ps/(km·nm) in 1.45~1.65 μm optical communication-window. Afterwards, we get a near-zero flattened dispersion curve by increasing the hole spacing. In a wide wavelength range from 1.350 to 1.736 μm, the region of dispersion variation is from -0.45 to 0.57 ps/(km·nm). For PQF_2, the dispersion value can be controlled within 4.795±0.355 ps/(km·nm) by adjusting the parameters in the wavelength range of 1.45 to 1.68 μm.

Keywords: fiber optics　flattened dispersion　finite element method　photonic quasicrystal fibers(PQF)

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