

论文

弱双折射光纤布喇格光栅反射偏振对温度响应特性的研究

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摘要:

理论分析了切趾弱双折射光纤布喇格光栅反射偏振相关特性与温度之间的关系.数值模拟了切趾弱双折射光纤光栅的反射谱、偏振相关损耗和差分群时延随波长变化曲线.实验测出了不同温度下反射谱、偏振相关损耗和差分群时延随波长变化曲线.根据实验结果对偏振相关损耗和差分群时延的变化情况作出了分析.反射偏振相关损耗呈现两个峰值,随温度增加两峰漂移程度相同,表明偏振相关损耗无明显差异.差分群时延最大值随温度增加成线性向长波方向漂移,证明了光纤光栅正交模损耗变化的等同性.综合理论分析与实验结果表明:切趾弱双折射光纤布喇格光栅的偏振特性随温度产生明显的变化,其正交模变化呈现等比例特性.

关键词: 光纤布喇格光栅 双折射 偏振相关损耗 差分群时延

Reflected Polarization Properties of Low-birefringence Fiber Bragg Gratings Based on Temperature Effect

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Abstract:

The relationship between reflected polarization properties of apodized low-birefringence fiber Bragg gratings and temperature effect are analyzed theoretically. Numerical value simulates reflection spectrum of the apodized low-birefringence fiber Bragg gratings, polarization dependent loss and differential group delay curves with wavelength. The reflected center wavelength, polarization dependent loss and differential group delay which evolve with wavelength are measured under different temperature and the curves are drawn accordingly. The evolution of polarization dependent loss and differential group delay are analyzed according to the results of the experiment. In the experiment, reflected polarization dependent loss presents two peaks which shift to an equal extent as temperature changes and it indicates that polarization dependent loss has no significant difference. The maximum of difference group delay with temperature increase linearly shifts to long wavelengths and it is proved that the loss of orthogonal modes has changed equally. The synthetical theory analysis and experimental results show that the evolution of reflected polarization properties of apodized low-birefringence fiber Bragg gratings changes obviously with temperature changing and the changing of orthogonal modes presents proportional characteristics.

Keywords: Fiber Bragg grating Birefringence Polarization dependent loss Differential group delay

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