

论文

横向应力对保偏光纤偏振耦合特性的影响

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摘要:

在考虑到各向同性光纤和各向异性光纤在横向应力作用下介电常量变化量差别的条件下,利用弹光效应和折射率椭球得到了外界横向应力与保偏光纤介电常量变化量的关系.采用耦合模理论分析了横向应力作用下保偏光纤偏振耦合特性,数值模拟了横向应力大小、方向以及作用长度对偏振耦合强度的影响,应力作用方向与主轴(未受外力)成 45° 时,光纤受扰最敏感|输出消光比随力作用长度呈现周期性变化,力的作用大小不同,交换能量周期也不同|在应力大小部分区域输出消光比和横向应力大小成线性关系,结论与已有实验结果一致.

关键词: 保偏光纤 偏振耦合 横向应力 耦合模理论

Characteristic of Polarization Maintaining Fiber Under Transversal Force

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Abstract:

Based on the photo-elastic effect and index ellipsoid,the relationship between transverse force and dielectric constant variation of polarization maintaining fiber(PMF) was obtained under the consideration of the difference between isotropic and anisotropic optical fiber under transverse force.Polarization coupling characteristic of PMF under transversal force was analyzed based on coupled-mode theory.The relationships between the coupling intensity and the amplitude,direction and the acting length of the transversal force were clarified by numerical simulation.When the direction of force was 45° ,the coupling intensity of PMF was the best sensitive to the transversal force.The output extinction ratio changed periodically with acting length of the force,and different amplitude of the force corresponded to different period.The linear relation between the output extinction ratio and the amplitude of transverse force in the part region was found.These characteristics are consistent with previous experimental results.

Keywords: Polarization Maintaining Fiber(PMF) Polarization coupling Transversal force Coupled-mode theory

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