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平面光波导与阵列光纤耦合分析

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摘 要：根据光波导理论，论述平面光波导与阵列光纤对准耦合原理。基于光束传播法，分析平面光波导与阵列光纤对准耦合过程中对准偏差(横向位错、纵向间距和轴向角度)与耦合损耗之间的关系，对对准偏差的光学容差也进行分析。研究结果表明：平面光波导与阵列光纤耦合损耗对横向位错相当敏感，轴向角度偏差对耦合损耗的影响也较大，轴向间距的影响则要小得多；若以0.15 dB的附加损耗考察，平面光波导与阵列光纤横向位错、纵向间距、轴向角度的光学容差分别为1 μm，16 μm和0.65°；所得仿真结果与理论计算结果基本吻合，说明应用光束传播法分析平面光波导与阵列光纤对准耦合是有效的。

关键字：平面光波导；阵列光纤；耦合；光束传播法

Coupling analysis between planar optical waveguide and fiber array

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Abstract: The theory of aligning and coupling of planar optical waveguide and array fibers was discussed based on optical waveguide principles. The relations between alignment deviation and coupling loss were analyzed based on beam propagation method. The optical tolerance of alignment deviation was studied based on the simulation results. It is found that the coupling loss is sensitive to the transverse dislocation, the second is the angle deviation, and the third is the axial gap. Moreover, when the coupling loss is 0.15 dB, the optical tolerance of the transverse dislocation is 1 μm, the optical tolerance of the angle deviation is 0.65°, and the optical tolerance of the axial gap is 16 μm. The simulation results are in good agreement with the theory results, the analysis for aligning and coupling of planar optical waveguide and array fibers is effective by beam propagation method.

Key words:planar optical lightwave; fiber array; coupling; beam propagation method

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