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光通信与光信息技术

空间光-光纤阵列耦合自动对准实验研究

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摘要： 为了使空间光-光纤耦合结构具有一定的抗抖动能力，采用自聚焦透镜和多模光纤耦合阵列结构结合模拟退火算法对光纤阵列实行2维控制，自动搜寻空间光-光纤耦合最佳视轴对准姿态。对光纤阵列和模拟退火算法进行了理论分析实验验证，取得了耦合效率变化的相关数据。结果表明，通过模拟退火算法可以实现空间光-光纤视轴对准，且光斑中心在耦合端面中心抖动小于2.5mm时，耦合功率波动小于35%，满足无线激光通信系统的要求。

关键词： 光通信 空间光耦合 模拟退火算法 耦合效率

Experimental study about fiber array coupling and auto-alignment

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Abstract: In order to improve anti-jitter capability of a fiber coupling structure, a fiber array with self-focusing lens was designed, the optical fiber array was controlled by means of annealing algorithm and the optimal visual axis alignment position was found. The fiber array and simulated annealing algorithm were analyzed theoretically, and the data of coupling efficiency was achieved. Experimental results show that the simulated annealing algorithm

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can find the optimal visual axis alignment position. When spot center moving less than 2.5mm on the coupling surface, the power coupled in the fiber fluctuates less than 35%. It can meet the requirements of free space optical communication system.

Keywords: optical communication space optical coupling simulated annealing algorithm coupling efficiency

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