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光纤技术

单模及多模光纤折射率分布测量方法研究

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摘要 通过对几种单模及多模光纤折射率分布测量方法的分析研究，
得到单模光纤与多模光纤折射率分布测量方法的根本区别。由于单模光纤芯径比较小，
因而只能用波动理论分析其传输机理，其中的远场法和近场法测量都是基于标量亥姆霍兹波动方程，
即以单模光纤的基本传输理论进行测量；而多模光纤由于其芯径比较大，
故而用射线理论分析其传输原理较为合理。多模光纤的折射近场法和近场扫描法均是以纤芯半径处数值孔径不同，
对应的折射模和传导模不同为依据来进行测量的。

关键词 单模光纤 多模光纤 波动理论 射线理论 折射率分布

分类号

Refractive Index Profile Measurement of Single mode and Multi mode Fiber

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Abstract Through analyzing some measurement procedures of refractive index profile of single mode and multi mode fibers; their essential differences are obtained. Since the core of single mode fiber is very small, its propagation mechanism can be analyzed only by the wave theory,and the measurements with the far field and near field methods are all based on the scalar Helmholtz wave equation, that is the refractive index profile measurements for single mode fiber are according to its basic transmission theory. Whereas the core of multi mode fiber is larger, the ray theory is appropriate to analysis of its propagation principle. The reason is that the multi mode fiber refracted ray method and near field scanning method are all based on the numerical apertures of various radii and the corresponding refractive patterns and propagation patterns.

Key words single mode optical fiber multi mode optical fiber wavetheory raytheory refractiveindex profile

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