

光纤技术

直锥形光纤传输性质的研究

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摘要

光纤通信的发展日新月异,光纤在信息的传输方面起着越来越重要的作用.通过把传输光纤的一端拉制成锥形,研究了光信号在锥形光纤中的传播行为.根据标量波动方程,运用高斯近似法,从理论上说明了光信号在锥形光纤中的传输特性和能量损耗,分析了光功率在光纤中的分布、光纤中基模场的模半径与光纤芯径的关系、光纤中光的传输模式与光纤芯径的关系、锥形光纤的传输效率与锥形光纤尖端直径的关系等.在实验上,用剪断法测量了锥形光纤的传输效率随锥形光纤圆锥角的变化关系.通过选取一系列锥角的大小,测出相应的传输效率,作出“湫”是“?”并用具体数据进行半定量计算,得出锥形光纤顶端锥体的角度及其变化愈大愈光滑,锥形过渡区越短,传输效率就越高的结论.

关键词 [锥形光纤](#) [传输效率](#) [锥度](#) [基模](#)

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The Study for Transforming Property of Right Cone Fiber

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Abstract

Fiber-optic communication has been growing at a phenomenal pace over the past twenty years, so rapidly, in fact, that its impact is increasingly felt in nearly all aspects of communication technology. Transmission properties of tapered fiber are discussed in this paper. The transmission efficiency of the tapered fiber is measured. By the scalar wave equation and Gaussian approximation, transmission properties of tapered fiber are analyzed, and the power losses caused by taper angle are also calculated. The distribution of power in the fiber versus the normalized frequency, the spot size versus the core diameter, the data sheet of transmission efficiency with coning angle, and the transmission efficiency T versus the tip diameter are all discussed in this paper. According to a sequence of coning angle, the curve of transmission efficiency versus coning angle is given. From the experiments and analyses, it could come to the conclusion that the bigger the taper angle is, the higher the transmission efficiency becomes.

Key words [tapered fiber](#) [transmission efficiency](#) [conicity](#) [basic mode](#)

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