Optical fiber communications

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Optical fiber transmission lines now appear to be competitive with copper wires and coaxial cables in certain applications. In addition, aplications not otherwise feasible may employ optical fibers. Considerable research and development effort has been devoted to producing silica fibers with extremely low loss ($<$ 1 dB/km) as well as to devising componets and techniques required to operate a fiber system. Established fiber-optical technology will be employed in a communication system by the Bell System in 1980.

The state-of-the-art in fibers, cables, splices, lasers, LEDs, modulators, detectors and integrated optics will be reviewed in a tutorial fashion as time allows. Although much of the early work was devoted to multimode fibers and LED sources, more attention is now being given to single-mode fibers and laser sources. Current research is aimed at exploring longer wavelengths (1.3–1.5 μm) where fiber losses are smaller and bandwidths are greater than at the GaAs laser wavelength ($\sim$ 0.8 μm). Optical waveguide switches and other devices may someday be integrated on a single substrate to perform complex functions in sophisticated second-generation systems.

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现在看来，在某些应用中光纤传输线可与铜线或同轴电缆相竞争，而且有些应用只有依靠光纤才能实现。为了获得极低损耗(＜1分贝/公里)的石英光纤并设计光纤系统运转所需的器件和技术，已进行了相当多的研究和发展工作。现已建立的纤维光学技术将于1980年在贝尔公司的通信系统中使用。

如果时间允许，将对光纤、光缆、接头、激光器、发光二极管、调制器、探测器和集成光学器件的现状以讲授的方式进行评述。早期的工作大多致力于多模光纤和发光二极管光源的研究，而现在则更多注意单模光纤和激光光源。新近的研究准备探索更长的波长范围(1.3～1.5微米)，因为同GaAs激光器的波长(～0.8微米)相比，在这一波段光纤损耗更低，带宽更大。在先进的第二代光纤系统中，也许有一天会将光波导开关和别的器件集成于单块基片上去完成复杂的功能。