Abstracts

Design Considerations of Broadband Dual-Mode Optical Fibers

J.-I. Sakai, K. Kitayama, M. Ikeda, Y. Kato and K. Tatsuya. "Design Considerations of Broadband Dual-Mode Optical Fibers." 1978 Transactions on Microwave Theory and Techniques 26.9 (Sep. 1978 [T-MTT]): 658-665.

We propose and present design data for a new type of graded index fiber which has a profile and radius such that only two mode groups (LP/sub 01/ and LP/sub 11/) propagate and both propagate with virtually identical group velocities. This dual-mode fiber has a core diameter approximately twice that of a conventional step index single-mode fiber. For example, a core diameter of 16.3 mu m is attainable with relative index difference Delta = 0.3 percent at 1.25-mu m wavelength. Fabrication tolerances securing a group delay difference below 100 ps/km are given by a power-law profile parameter alpha = 4.85 ±0.25 and a normalized frequency upsilon = 4.45 ±0.11. The allowable upsilon-value deviation range to keep the group delay difference within 100 ps/km is about five times as large as that of a step-index fiber, in which group delays of two mode groups are matched. Comparison with a multimode graded-index fiber, with respect to group delay characteristics and bending loss of the dual-mode fiber, are also discussed.

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