Investigation of bandwidth in multimode graded-index plastic optical fibers

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Abstract: A new method is proposed for investigating the bandwidth in multimode plastic optical fibers (GI POFs). By numerically solving the time-dependent power flow equation, bandwidth is reported for a varied launch conditions (radial offsets) of multimode GI POF. Our theoretical results are supported by the experimental results which show that bandwidth decreases with increasing radial offset. This decrease is more pronounced at short fiber lengths. At fiber length close to the coupling length L_c at which an equilibrium mode distribution (EMD) is achieved, this decrease becomes slower, indicating that mode coupling improves bandwidth at larger fiber lengths. With further increase of fiber length, bandwidth becomes nearly independent of the radial offset, indicating that a steady-state distribution (SSD) is achieved. Such a fiber characterization can be applied to optimize fiber performance in POF links.