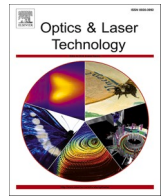




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Power flow in multimode W-type plastic optical fibers with graded index core distribution

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ABSTRACT

A method is proposed for investigation of transmission along a multimode W-type (doubly clad) plastic optical fiber (POF) with graded index (GI) distribution of the core. The multimode W-type GI POF is designed from a multimode singly clad (SC) GI POF fiber upon modification of the cladding layer of the latter. The transmission characteristics of such proposed W-type GI POF are determined from the numerical solution of the power flow equation. We have shown that coupling length L_c at which an equilibrium mode distribution (EMD) is achieved in W-type GI POF is shorter than this length experimentally determined for the original SC GI POF. This is a consequence of leaky mode losses which reduce the number of higher guided modes involved in the coupling process, thus reducing the length L_c . We have shown that the shorter the length L_c , the earlier the bandwidth switches from the functional dependence of $1/z$ to $1/z^{1/2}$. We found that bandwidth improves with thinner and shallower intermediate layers. Finally, the bandwidth of the W-type GI POF analyzed in this work is greater if compared to the bandwidth of the original SC GI POF.

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