

Spatial division multiplexing in nine-core graded index plastic optical fibers

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Abstract

We propose a spatial division multiplexing in a new designed multimode multicore graded index plastic optical fiber with nine cores arranged in an octagonal array. The influence of mode coupling on two-channel spatial division multiplexing capability in each of nine cores is investigated by solving the power flow equation. Our numerical results show that mode coupling significantly limits the fiber length at which the spatial division multiplexing can be realized in each of nine cores with a minimal crosstalk between two neighbor spatial optical channels. Two spatial channels in the proposed nine-core graded index plastic optical fiber can be employed with a minimal crosstalk up to the fiber length of 5 m, which is about 18% of the coupling length (fiber length where equilibrium mode distribution is achieved). Such characterization of multicore graded index plastic optical fibers should be considered in designing a multicore optical fiber transmission system for space division multiplexing.

Keywords: multicore plastic optical fibers, graded index optical fibers, space division multiplexing, mode coupling

(Some figures may appear in colour only in the online journal)