

Communication

# Theoretical Investigation of the Capacity of Space Division Multiplexing with Multimode Step-Index Air-Clad Silica Optical Fibers

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**Abstract:** We studied the effect of mode coupling on the space division multiplexing (SDM) capabilities of multimode step-index (SI) air-clad silica optical fibers by numerically solving the power flow equation. Mode coupling considerably reduces the length of these fibers at which space division multiplexing may be achieved with minimal crosstalk between neighboring optical channels, according to the findings. Up to 120 m and 30 m, respectively, the two and three spatially multiplexed channels in the investigated multimode step-index silica optical fibers can be used with low crosstalk. When building a space division multiplexing-based optical fiber transmission system, such characterization of optical fibers should be taken into account.

**Keywords:** air-clad silica optical fibers; microbends; mode coupling; space division multiplexing

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