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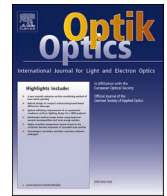
Original research article

Wavelength dependent transmission in W-type plastic optical fibers with graded index core distribution

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ABSTRACT

This paper investigates the wavelength dependence of the equilibrium mode distribution (EMD) and steady state distribution (SSD) in W-type plastic optical fibers (POFs) with graded index (GI) core distribution for parametrically varied width of the fiber's intermediate optical layer and refractive index of the outer cladding. The numerical solution of the time-independent power flow equation is used to determine the transmission characteristics of the W-type GI POF. We demonstrated that the coupling length L_c required to achieve an EMD in W-type GI POF is shorter than the length determined experimentally for the original SC GI POF at 633 nm. We also demonstrated that as the wavelength increases, the EMD and steady-state distribution (SSD) are achieved at shorter W-type GI POF lengths. This is explained by the increase in leaky mode losses as wavelength increases. This makes it easier to tailor W-type GI POFs to a specific application at different wavelengths.

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