Abstracts

Transmission Bandwidth of a Lens Waveguide with a Curved Axis

In a lens waveguide with a curved axis, light beams appreciably different in frequency split and take different paths due to the effect of chromatic aberration of lens. The deviation from a main beam can grow cumulatively through the curved lens waveguide. This effect knits permissible bandwidth to be transmitted without loss of beams. For bends having tilts and offsets at the connections to the straight waveguides, the deviation of the light beam from the guide axis due to the effect of chromatic aberration is derived. With random circular bends the bandwidth is inversely proportional to the square root of the number of bends and proportional to the average radius of curvature. For a normal design of the curved waveguide the allowable bandwidth is expected to be sufficiently broad for signal transmission, but it is narrow in the sense of optical frequency.