PHASE AND INTENSITY AT THE OUTPUT OF MULTIMODE OPTICAL FIBER CALIBRATED WITH INTERNAL REFERENCE MODES

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Multimode optical fibers (MMF) are widely used in telecommunication and scientific applications. One of the features affecting performance in these areas is a modal dispersion, i.e. different phase velocities for waves propagating in modes of different order. In the area of fiber endoscopy, it is necessary to adjust the phases of the propagation modes to obtain a sharp focus located near the output of MMF. This point can then be scanned across the field of view to obtain a sharp image via laser scanning microscopy[1]. Standard procedure maps the phase shift between the internal light field and an external reference wave for a set of plane waves at the proximal end of MMF and all the locations of the scanning point at the distal end of MMF resulting in so-called transmission matrix[2]. Hereby, we suggest a method for transmission matrix measurement relying on a set of internal reference waves, which makes the experimental setup and component alignment more simple. The technique will be demonstrated by MMF projection of optical landscapes with well-defined phase and intensity profiles, discussing advantages and drawbacks of the modified method.

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