

Investigation of Photonics Devices Pigtailling Using Laser Welding Technique

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Abstract:

Coupling of highly elliptical laser diode emission into single mode fiber using two spherical ball lenses is investigated and the effectiveness of the mode matching with the circular mode field of the fiber is realized. Coupling efficiency is theoretically analyzed by employing ray and Gaussian beam optics. A 100% coupling efficiency is obtained is found to be largely affected by the angular, lateral and transversal offsets. It can also be controlled significantly by optimizing the lenses separation distance. The experimental measurements agree with the theoretical calculations. However, the maximum coupling efficiency obtained is around 75% due to some practical limitations regarding the positioning of ball lenses and their separation. From the variation of coupling efficiency with lateral, transversal and angular offsets, the effective mode matching is inferred. Laser welding technique with active alignment facilities have been used in the alignment and attachment of all the coupling components. Laser welding pulse parameters have been optimized for reliable weld yield.

Keywords: Coupling efficiency, laser welding, misalignment tolerances, mode field, ball lenses