Abstract

Variational principle has been incorporated in the proposed semi analytical formulation to characterize graded index optical fiber and optimization process is being carried out by Nelder-Mead Simplex method for nonlinear unconstrained minimization. By introducing increased optimizing parameters in the formulation of fundamental modal field, more flexibility to refine a design and thus achieving a greater accuracy for a particular requirement, has been presented. Employing variational technique, effective index, normalized propagation constant, normalized group delay and modal dispersion parameter of an optical fiber have been evaluated analytically, by using the proposed formulation of fundamental field. The calculations show excellent agreement to the exact results, over a wide range of normalized frequency. Optimized values of three parameters, incorporated in the fundamental modal field have been presented for various values of normalized frequencies. This approximation can be used in the analysis of doped and nonlinear fiber amplifier, or in the case of dispersion–shifted fiber with large effective area.
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