Abstracts

Analysis of Wave Propagation in Inhomogeneous Optical Fibers Using a Variational Method

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The variational method is used to determine the propagation characteristics of an optical fiber consisting of a core with an arbitrary refractive-index distribution and a uniform cladding. The problem is first translated into a variational problem; the functional is computed upon the TEM-approximation basis. The variational problem is then solved by using the Rayleigh-Ritz method. The computed propagation characteristics are presented for refractive-index distributions of practical interest. The single-mode condition for a quadratic self-focusing fiber is obtained as $v < 3.53$ where v denotes the conventionally used normalized frequency; this result agrees with the numerical analysis by Dil and Blok. The obtained characteristic equations for the simplest case (uniform core case) are compared with analytic solutions to ensure the validity of the analysis.

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