Abstracts

Transversely Anisotropic Curved Optical Fibers: Variational Analysis of a Nonstandard Eigenproblem

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A new variational functional is introduced for the analysis of curved open and closed waveguides. The theory is based on the variational principle for nonstandard eigenvalue problems, recently applied for straight anisotropic fibers. The present method is valid for arbitrary waveguide cross section and arbitrary radius of curvature for closed waveguides, but for open guides, the radius should be large enough because the method predicts the real part of the propagation constant, not the imaginary part, which gives the attenuation in curved open structures. The dielectric medium can be homogeneous or nonhomogeneous with transverse and/or longitudinal anisotropy. As an example of the method, curved isotropic and anisotropic single-mode fibers with two different kinds of anisotropy models are studied. The analysis includes field distributions, changes in the dispersion curves due to reformed geometry, and birefringence characteristics in curved anisotropic fibers.

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