Abstracts

TM Waves Guided by Nonlinear Planar Waveguides

This paper presents a numerical method for calculating the dispersion relations and field distributions of stationary nonlinear TM waves guided by optical planar waveguides with intensity-dependent permittivities. The method can basically treat arbitrary linear permittivity profiles and arbitrary types of the nonlinearity, since it is based on a numerical integration of the nonlinear wave equation. In this paper, the numerical results for TM waves guided by a symmetric nonlinear film with linear claddings and a three-layer waveguide with a nonlinear cover have been presented for different mechanisms of the nonlinearity and compared with those for TE waves. The treated waveguide is weakly guiding and the nonlinearity is of the Kerr type. It is shown that under these assumptions, the dispersion relations for TM waves are similar to those for TE waves except for the power levels required for operation. The behavior of TM waves is also little affected by the nonlinear mechanism. These features can be derived from the fact that the longitudinal electric field component E_z is fairly small compared with the transverse component E_x.

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