Modeling Second-Order Nonlinear Effects In Optical Waveguides Usinga Parallel-Processing Beam Propagation Method

Masoudi, H.M. Arnold, J.M.;Dept. of Electr. Eng., King Fahd Univ. of Pet.Miner., Dhahran;

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Summary

In this work, we present a simple efficient numerical solution for the three-dimensional coupled wave equations containing a second-order nonlinearity, using an explicit finite difference beam propagation method (EFD BPM). The linear EFD-BPM is known to be very efficient and to gain large speed up when implemented on parallel computers. The new nonlinear version of the EFD-BPM has the same features of the linear counterpart in using two separate computational windows, one for the fundamental field and the other for the second-harmonic field. We demonstrate the implementation and discuss the application of this method to a nonlinear rib waveguide using the quasi-phase-matching technique