큰 분기각을 갖는 집적화된 비선형 Y-접합 광도파로
Integrated Nonlinear *Y*-Junction Waveguides with a Large Branching Angle

정 종 술*, 송 석 호, 이 일 항
한국전자통신연구소 기초기술연구부

Much progress has been made in the studies of nonlinear guided waves exhibiting ultrafast all-optical switching and self-routing characteristics for future telecommunication networks. Special attention has been focused on the nonlinear directional couplers (NLDC)[1] and two mode interference (TMI)[2] couplers such as zero-gap nonlinear directional couplers or nonlinear X junctions. However, the NLDC is rather sensitive to the structural parameters as well as the wavelength and the intensity of the incident light[2], and the TMI coupler has a branching angle normally smaller than one degree.[2]

In this work, we have proposed an integrated nonlinear *Y*-junction waveguide[3], as a power-controlled all-optical switch, which consists of a linear waveguide and an adjoining nonlinear bent waveguide integrated together with a large branching angle. We have found through some numerical calculations that the Gaussian beam launched into the nonlinear *Y*-junction waveguide is dramatically coupled into the nonlinear bent waveguide with the branching ratio of greater than 85%, even though the branching angle increases up to 5 degrees.

1. S.M. Jensen, IEEE J. Quantum Electron. **QE-18**, 1580 (1982).
2. K. Al-hemvari, A. Villeneuve, J. Kang, J.S. Aitchison, C.N. Ironside, and G. Stegeman, in *Conference on Lasers and Electro-Optics*, **Vol. 8**, 1994 OSA Technical Digest Series, pp. 56.
3. J.-S. Jeong, S. H. Song, and E.-H. Lee, *International Quantum Electronics Conference*, Sydney, Australia, July 14-19, 1996, Tul108.

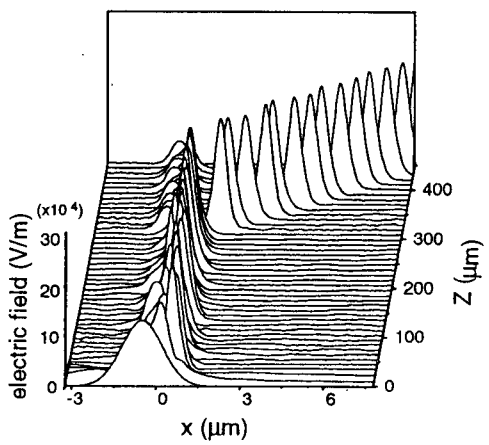

Fig. 1 Field evolution with the Gaussian beam excitation for P_i=44.06 mW/mm, β=1.6, and the branching angle of $\theta = 3^\circ$. The nonlinear *Y*-junction waveguide structure is shown in inset

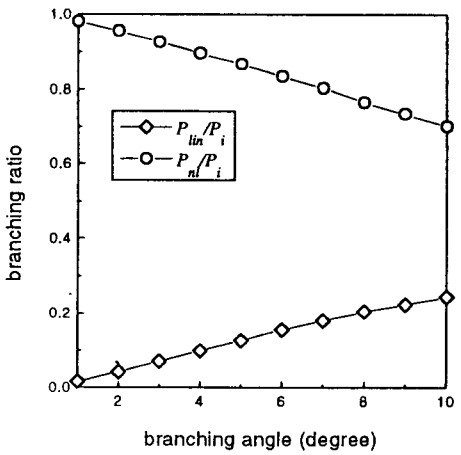

Fig. 2 Dependence of the branching ratio on the branching angle with the fundamental mode of P_i=44.06 mW/mm and β=1.6.