Abstracts

Quasi-Guided Modes and Related Radiation Losses in Optical Dielectric Waveguides with External Higher Index Surroundings

Y. Suematsu and K. Furuya. "Quasi-Guided Modes and Related Radiation Losses in Optical Dielectric Waveguides with External Higher Index Surroundings." 1975 Transactions on Microwave Theory and Techniques 23.1 (Jan. 1975 [T-MTT] (Special Issue on Integrated Optics and Optical Waveguides)): 170-175.

Mode filter actions are found theoretically in an optical dielectric waveguide consisting of a core and a thin cladding layer which is further surrounded by an external higher index region. The propagating waves, which are usually considered to be cutoff modes, can be guided with a small amount of loss under a certain condition. These waves are defined here as quasi-guided modes. These modes tend to the guided modes of the guide when the cladding thickness increases infinitely. A method is given to estimate the losses. As an example, the radiation losses are formulated for a symmetric slab waveguide, and are found to be approximately proportional to the cube of the mode number of the quasi-guided mode. Therefore, losses of the quasi-guided modes depend strongly on the mode number. It is suggested that fibers with large core diameters can be used as quasi-single mode fibers by covering the clad-type multimode fibers with external higher index surroundings and choosing the parameters properly.

❑ Return to main document.