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A novel proposal for all optical PhC-based demultiplexers suitable for DWDM applications

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Abstract In this paper due to the crucial role of optical demultiplexers in wavelength division multiplexing and dense wavelength division multiplexing applications, we proposed a new mechanism for designing all optical photonic crystal based demultiplexers with 8, 16 and 32 output channels. Our proposed mechanism for wavelength selecting is a resonant defect structure which consists of one central defect and four defects around the central defect. It has been shown that the selected wavelength depends on the radius of the central defect and the distance between the central defect and other four defects. In all the three proposed demultiplexer the channels spacing is less than 1 nm. We used plane wave expansion method for extracting the band structure of the photonic crystal and employed finite difference time domain method for studying the optical properties of the designed devices.

Keywords Dense wavelength division multiplexing · Demultiplexer · Photonic crystal · Band gap

1 Introduction

Currently photonic crystals (PhCs) are the best platforms for designing all optical devices (Sakoda 2001). The main goal in designing optical devices is designing all optical integrated circuits and all optical networks without any electrical elements. The periodic distribution

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