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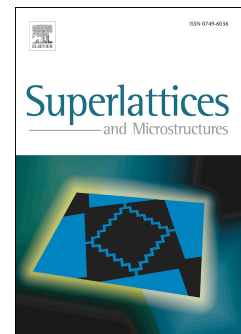
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An ultra-compact all optical full adder based on nonlinear photonic crystal resonant cavities

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Abstract

In this paper we are going to propose and design an all optical full adder based on photonic crystal. For realizing the proposed structure we will use four nonlinear resonant cavities inside a two dimensional photonic crystal. Nonlinear resonant cavities will be created by replacing the ordinary rods via defect rod made of nonlinear material such as doped glass. The simulation results show that the worst cases for logics 0 (the maximum normalized power in OFF state) and 1 (the minimum normalized power in ON state) are 3% and 53% for SUM port and they are 10% and 100% for CARRY port respectively. Also the maximum delay time for the proposed device is about 8 ps.

Keywords: Photonic crystal, Full adder, Resonant cavity, Photonic band gap, Nonlinear Kerr effect.

1. Introduction

All optical full-adders are significant optical structures used as the main building block in all optical arithmetic logic units (ALUs). All optical ALUs are essential for creating all optical data and signal processing applications. Compactness, high speed performance and low operational power are the main characteristics for all

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