Abstract

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Optimization of Triangular Lattice Defect in Dynamic Photonic Crystal Structures for Optical Storage and Processing

A triangular lattice GaAs photonic crystal structure was proposed in a previous work [1] for optical storage in a dynamic modulation process. This work presents a defect optimization of this tunable coupled resonator array. Preserving translational invariance and adiabaticity, this structure exhibits an optical analogue to electromagnetic induced transparency. This triangular lattice structure shows an advantage over the previously proposed square one [2, 3] in compressing higher bandwidth pulses. The main problem of this structure is the introduction of higher group-velocity dispersion. In the present work, the structure is redesigned so as to change the operating range of frequency for the propagating pulse. In this way, the group-velocity dispersion is eliminated to values close to that of the square lattice structure. The final design, therefore, combines both higher compressible bandwidth and lower group-velocity dispersion in addition to a fabrication advantage.