

Photonic crystal based higher-order bandpass filter design for WDM communication systems

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We report on the design of higher-order filter based on coupled defects in photonic crystals. The designed filters consist of coupled point defect resonators embedded in two-dimensional photonic crystal waveguide.

The coupling between defect resonators has been modeled using the coupled mode theory in time [1], and the general method to compensate for the arbitrary phase shift effect in the coupling has been investigated. The designed filter shows a flat pass band of 50 GHz and 0.3 dB in-band ripple, which is suitable for typical WDM communication systems with 100 GHz channel spacing as seen in Fig. 1. The performance of the filter has been calculated using finite-difference time-domain method.

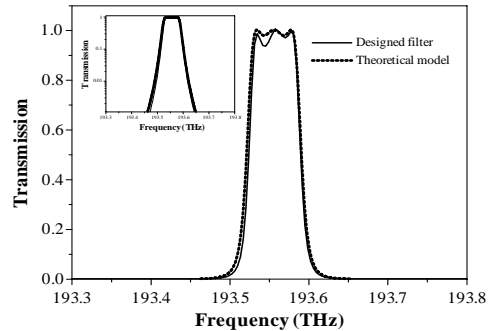


Fig. 1 Transmission of the designed photonic crystal based third-order filter

- [1] H. A. Haus, and Y. Lai, *IEEE J. Quantum Electron.*, **28**, 205 (1992).