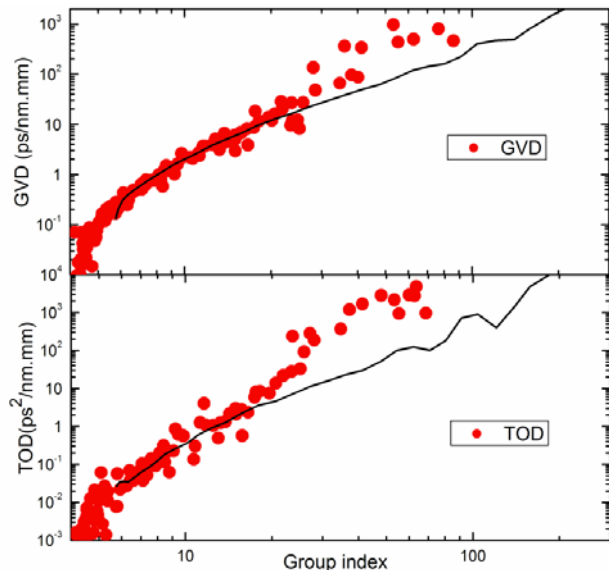


High Order Dispersion in Photonic Crystal Waveguides

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Dispersion engineering in photonic crystal waveguides is viewed as an important direction of research for application in “slow light” delay lines, highly nonlinear devices, etc. [1-4] However available experimental information on chromatic dispersion (GVD) and higher order dispersion is limited due to difficulties in simultaneously measuring of both group delay and transmission amplitude in one set of experiments. Here the GVD and higher order dispersions have been measured in W1 PhC SOI waveguides with various lattice parameters utilizing an

integrated Mach-Zendher interferometer (MZI) with a photonic wire on one arm and a 250 μm long photonic crystal waveguide on the second arm [4]. The group velocity dispersion (GVD) was deduced by taking the first derivative of the group index measurements. Large signal to noise ratio in original experimental phase data allows to extract higher order dispersion behavior up to the 5th order and compare all these dependencies with the 3D plane-wave calculations.



GVD and 3d order dispersion (TOD) extracted from experimental transmission spectra of a PhC MZI. They are compared to results of 3D plane wave calculations.

1. Engelen et al, Opt. Express 14, 1658 (2006)
2. Yu Petrov and M. Eich, Appl. Phys. Lett. 85, 4866 (2004).
3. D. Mori and T. Baba, Opt. Express 13, 9398 (2005).
4. Vlasov et al., Nature 438, 65-69 (2005)