Intermodal dispersion conpensation in a PhC directional coupler.

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Photonic crystal directional couplers (PhCDC) are of general interest due to its compactness and high confinement of light [1]. However big intermodal dispersion can be found, specially near the band edge of one of the supermodes where the theoretical group velocity vanishes. This leads to a constraint in the bandwidth of a pulse travelling through it.

In this study, a novel intermodal dispersion compensator is presented. This compensator inverts the intermodal dispersion of a PhCDC by changing the relative dispersion relation of the supermodes of the structure. This is achieved by increasing the distance between the guides of the device [2]. Additionally, two mandatory requirements are fullfilled. The slope of the coupling coefficient has the same sign as in the PhCDC; and the coupling between its normal supermodes and those of the PhCDC are balanced. The last requirement has been achieved by introducing a small coupling area that has been optimized by a genetic algorithm.

[1] A. Martínez, F. Cuesta and J. Martí, *IEEE Photon. Tech. Letters*, **15**, 5 (2003).
[2] C. M. Sterke, L. C. Botten and A. A. Asatryan, T. P. White and R. C. McPhedran; *Optics Letters,* **29,** 12 (2004).