

Exploiting slow light via reflection suppression

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An important feature of planar photonic crystal (PhC) waveguides is their slow light regime, where true photonic band-gap guiding below the light cone can be exploited. The low group velocity of these modes is easily determined from the dispersion diagram, which considers infinitely long devices. To design practical finite-length devices exploiting this behavior [1], one must also consider the effect of terminating the PhC.

Here we use various semi-analytical and numerical techniques to show how the interface between a PhC and a photonic wire adversely affects the apparent group delay in devices using these slow-light modes. The Fabry-Perot response arising from reflections at these interfaces is seen experimentally in [1]. We then consider the design of a simple PhC taper based on a chirped lattice and analyze how the taper design must evolve to couple efficiently into increasingly low group velocity modes, thus suppressing reflections at the PhC-photonic wire interface.

- [1] S. Combrié, A. De Rossi, L. Morvan, S. Tonda, S. Cassette, D. Dolfi, A. Talneau, *Elec. Lett.*, **42**, 86 (2006) *and references therein*