Modelling lossy photonic wires: a mode solver comparison

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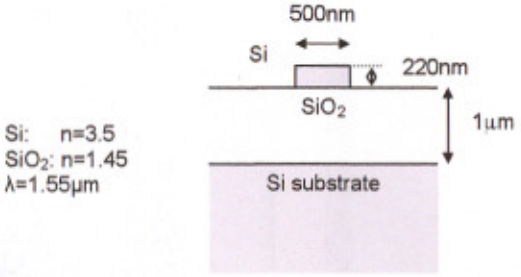
During the past decade, there has been a tradition of comparing the current state-of-the-art optical mode solvers from time to time [1]. In the framework of the European COST P11 action [2], we performed such a comparison, but this time with an additional complication, namely the modeling of an extremely small loss in the propagation constant due to substrate leakage.

The structure we modeled is the following photonic wire structure in the SOI material system:



Because of the limited thickness of the oxide buffer, some part of the power in the fundamental mode will leak to the substrate. The aim of this exercise was to calculate the complex propagation constant of the fundamental mode of this structure as accurately as possible.

We will present results from a wide variety of models, ranging from different finite-elements solvers, effective index and perturbation methods, fourier modal methods and film mode matching methods.

References

[1] J. Ctyroky, S. Helfert, R. Pregla, P. Bienstman, R. Baets, R. De Ridder, R. Stoffer, G. Klaasse, J. Petracek, P. Lalanne, J. P. Hugonin, and R. M. De La Rue, "Bragg waveguide grating as a 1D photonic band gap structure: COST 268 modelling task," OPT QUANT ELECTRON, vol. 34, pp. 455-470, 2002.

[2] COST P11 website: http://w3.uniroma1.it/energetica/

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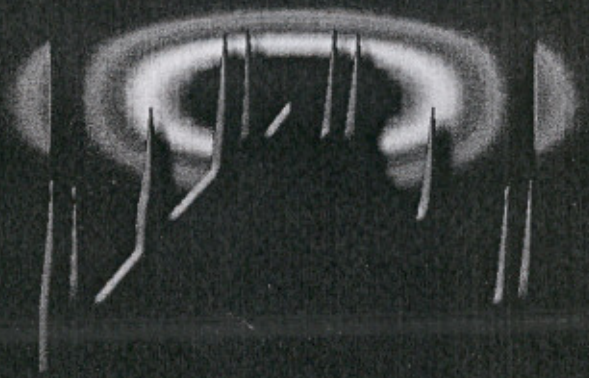

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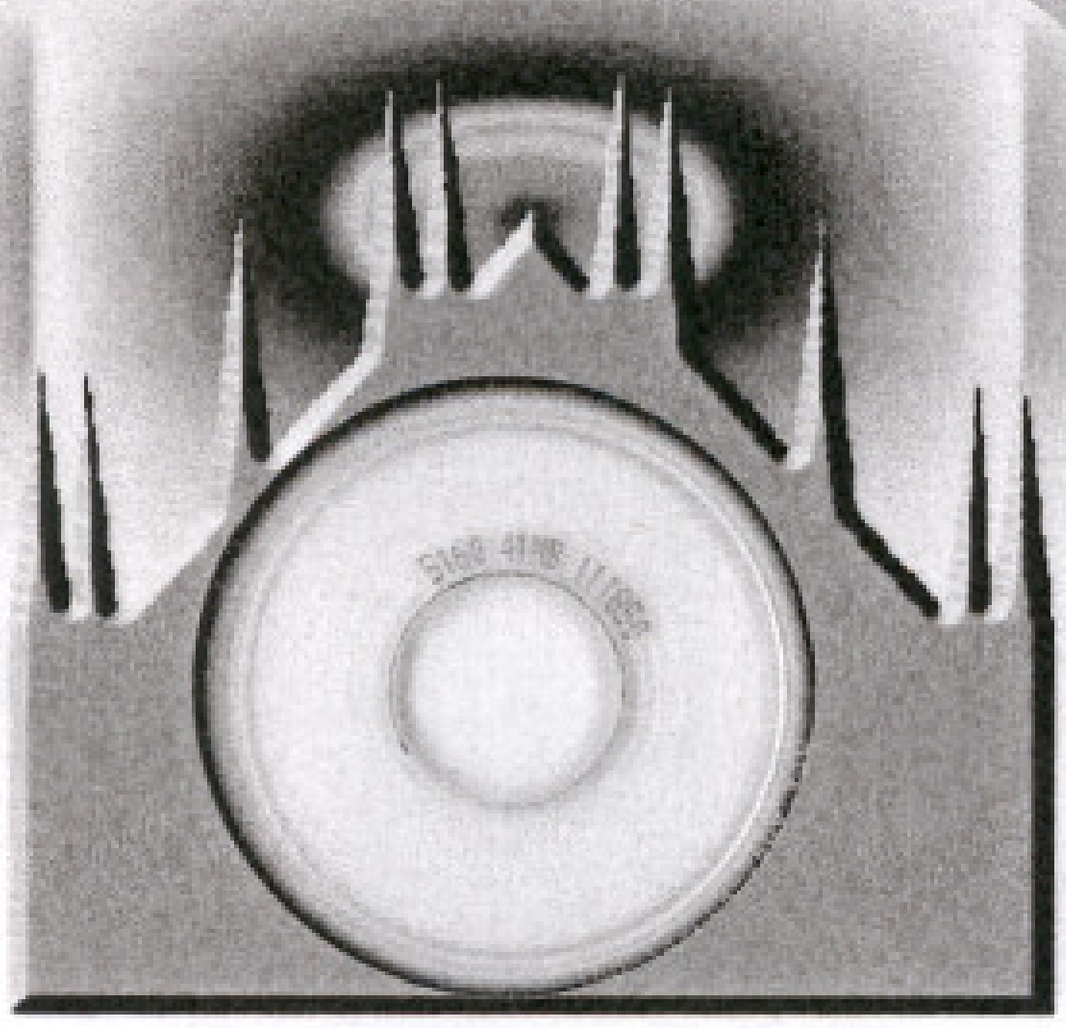

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