

Course Project File

Spring 2020

A) For a dielectric slab waveguide shown in figure 1 that has the following parameters:

$n_{\text{core}}(\text{Si}) = 3.44$, $n_{\text{cladding}}(\text{SiO}_2) = 1.44$, $d_{\text{core}} = 3 \text{ [um]}$ and for truncating the computational window take the total width $W_t = 10 \text{ [um]}$ and the total height $H_t = 10 \text{ [um]}$. Using the COMSOL frequency domain study and boundary mode analysis find the following:

- 1) Plot the fundamental TM mode at the input port and calculate its n_{eff} .
- 2) Plot the normalized electric field intensity that propagates from the input port into the output port
- 3) Calculate $\text{abs}(S_{11})$ i.e. Reflection and $\text{abs}(S_{21})$ i.e. Transmission. Please comment

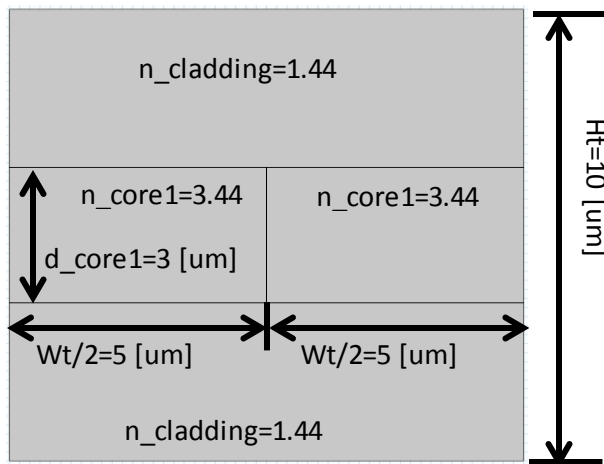


Figure 1

B) Repeat the same analysis for the following two connected waveguides shown in figure 2 and figure 3

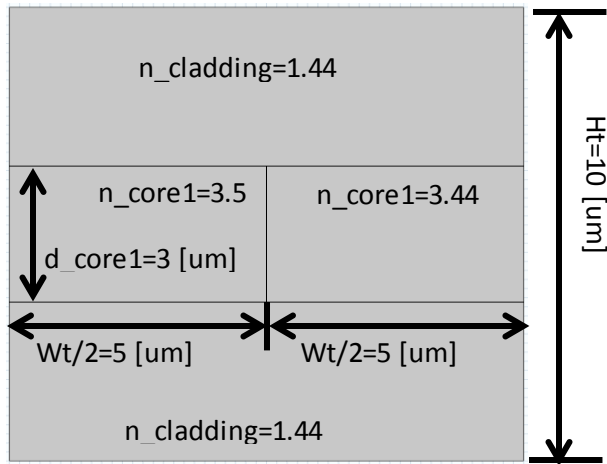


Figure 2

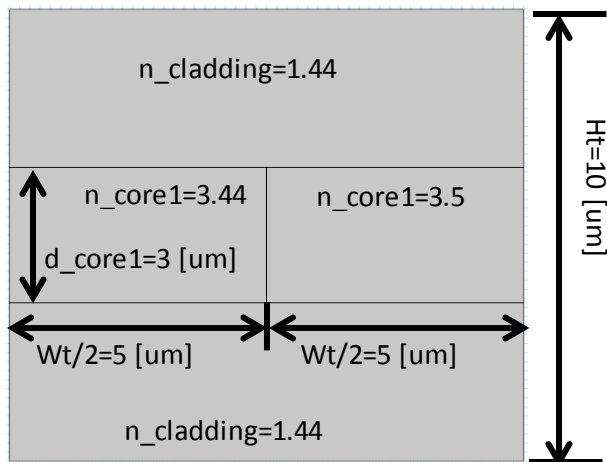


Figure 3

C) Repeat the same analysis for the following two connected waveguides shown in figure 4

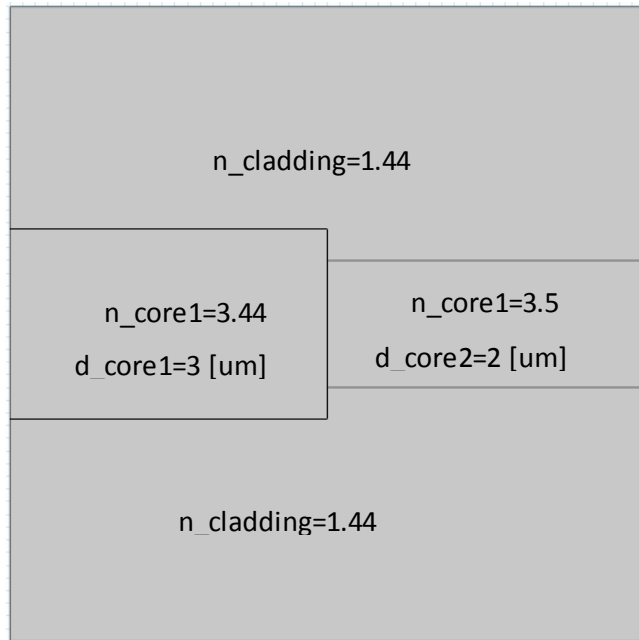


Figure 4

Please prepare a report containing the results and your physical explanation of the results.

Notes:

There may be an online discussion with Dr. Farhat and Bahaa after submission.

The project should be done individually. It is not allowed to work in groups. So, try to make your work as well as your presented report unique.