ECE 536 Integrated Optics and Optoelectronics

SPRING 2022
Problem Set No. 6 Due: 3/22/2022 Tuesday

When using software for plots and calculations, please attach code to end of homework.

1. State the topic of your choice (essentially a tentative title) for your final project/paper. Add a brief abstract to indicate your main goals or motivations, with any comments you might have on what you hope to learn. This does not need to be an extensive abstract, just a concise statement for the record.

2. Problem 7.15 in the textbook by Prof. Chuang, but assuming instead that the loss outside the waveguide is 13 cm^{-1}. Also, assume that the cavity length is 600 μm.

3. Problem 10.1 in the textbook by Prof. Chuang.

4. Problem 10.4 in the textbook by Prof. Chuang. For part (b) it would be useful to present the results as a 2D plot in color (R_j vs R_i) if you have readily available capabilities to do so.

5. Consider an AlGaAs/GaAs DH semiconductor laser with $\eta_i = 0.95$ and a loss coefficient $\alpha_i = 10\ cm^{-1}$, working at emission wavelength of 850 nm. Assuming that the facets have identical reflectivity properties, investigate with the aid of plots how the output power P_{out} behaves as a function of R of the mirrors and of the length of the cavity L, for a fixed input power P_{in}. For simplicity consider a perfect heat sink that maintains the temperature constant.