

PHYS 402: Electricity & Magnetism II
Due date: Thursday, October 3, 2013

Problem set #4

Griffiths 3rd Ed. [4th Ed.] problems
9.10 [9.10], 9.13 [9.14], 9.14 [9.15], 9.15 [9.16]

Problem: Index Matching

- a. Suppose you have two medium with $n_2 > n_1$, and you want to transmit light from medium 1 to medium 2 with minimal losses, does adding in a third medium between 1 and 2 with $n_2 > n_3 > n_1$ help reduce transmission losses? Support your claim with a quantitative analysis (do not assume any effects due to interference).
- b. What is the best you can do with this method, i.e. what is the highest transmission you can achieve compared to the original situation? What is the optimal choice for n_3 if the two original media were air and BK7 glass and propose a suitable material?
- c. Can you improve your index matching by adding additional layers of index matching materials?