

Homework (1)

- 1) Consider the thin prism subject discussed in class. Assuming an air-prism system, (a) Plot the relation between the minimum deviation angle versus the prism material refractive index for a prism angle of 10° . Use MATLAB. (b) Search to find a suitable transparent and low-absorption prism material for a deviation angle less than 10° .
 - 2) Consider the interference pattern of two monochromatic plane-wave sources with same intensity I_0 placed at oblique angle θ (case studied in class). (a) Design a photolithography experiment to produce features of less than 100 nm. (b) For your design, study the effect of the difference in location (Δz) between the two sources on the feature size (produce a plot).
 - 3) Refer to the air-glass interface case discussed in class. Considering both TE and TM polarizations, produce the reflection curves ($|r|$ vs. θ_i) for the following cases. (a) IR light incident from air on human skin. (b) UV light from glass to DI water. Use MATLAB and discuss your results.
 - 4) Study the propagation of blue light (wavelength=470 nm) inside InP material. Specifically, find the complex refractive index, attenuation coefficient, wavenumber and absorption coefficient at the given wavelength. Plot blue light power propagation (in percentage) inside a 2- μm slab of InP. Comment on your results.
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