WAVES, SOUND & PHYSICAL OPTICS DAY 15: LAB: POLARIZATION AND THIN-FILM STATIONS

CED 14.9/14.3 · Skills 3.A/1.A · FRQ: Experimental Design

RETRIEVAL

Two ideal polarizers are crossed. Predict the transmitted fraction and sketch where that point belongs on an intensity-versus-angle graph.

STATION SAFETY AND CONTROLS

Do not view the Sun through polarizers. Keep film solution away from electronics. Measure ambient sensor light first and keep source-sensor distance fixed.

Define I_0 as the corrected intensity after the first polarizer with analyzer axes parallel.

NOTES / REASONING

STATION A: POLARIZATION

θ between axes	raw intensity (lux)	ambient (lux)	corrected I (lux)	I/I0	cos²θ
1					
2					
3					
4					
5					
6					
7					

Graph corrected I vertically versus $\cos^2\theta$ horizontally. Add a best-fit line and interpret slope/intercept.

STATION B: THIN FILM

region/time	relative thickness evidence	reflected color or dark region	inversion/path explanation
1			
2			
3			
4			

Claim: Relate one observed color change or dark region to changing optical path $2nt$ and the reflection inversion count.

A qualitative white-light observation may contain several reinforced wavelengths. Do not assign one exact thickness without an identified order and wavelength.

ANALYSIS AND EVALUATION

1. Does the polarization graph support $I = I_0 \cos^2 \theta$? Cite slope/intercept and residual pattern.

2. Explain why subtracting ambient light matters most near 90°.

3. Use the film observation to support a phase/path claim without overclaiming one exact color.

4. Identify one limitation and improvement at either station.