BREWSTER ANGLE

Aim: To find the refractive index of transperent material by measuring brewster angle.

Apparatus: Breadboard, Laserdiode, polariser rotator, plate of transperent material (microscope glass slide), rotation stage, photodetector, Detector output unit.

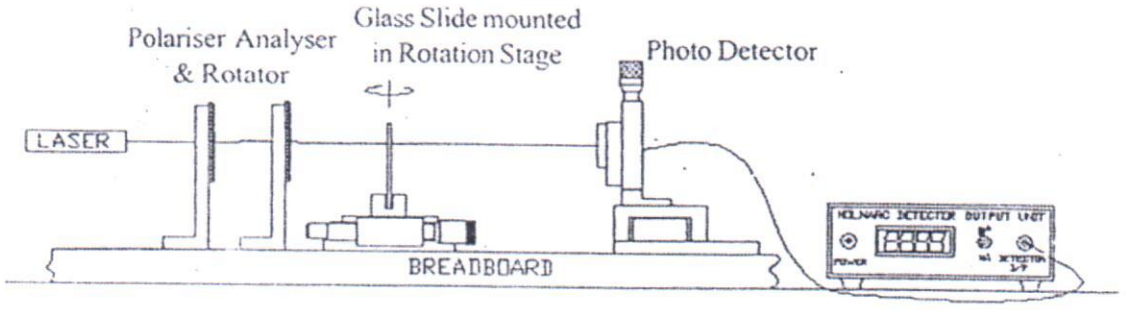
Theory: A beam of light incident on a dielectric transparent material can be resolved into parallel(P) and orthoganal(S) components. These components have different reflection coeffecient and Brewster discovered that at a particular angle of incidence ∂_B (called brewster angle), reflction coefficient of P-component goes to zero. At this angle direction of reflected and transmitted beam are orthogonal to each other.

By Snell's law,

$$\tan \partial_B = n,$$

n is the refractive index of the material.

Procedure:



a) Mount diode laser to the laser mount.
b) Switch on the laser and place the polariser rotator & analyser in front of it so as to make the *E* field parallel to the breadboard.
c) Mount the glass slide on rotation stage.
d) Orient the microscope slide to reflect the laser beam back into the laser output aperture.
e) Rotate the glass slide slowly and note the corresponding degree with intensity of the reflected beam from the glass slide.
f) The intensity has a minimum (almost zero) at Brewster angle ∂_B.
Knowing ∂_B refractive index is calculated from the formulae, $n = \tan \partial B$

Result: Calculated the refractive index of transparent material (glass slide) by measuring Brewseter angle.

Note:

Initially mount the glass slide, note that the Rotational stage is at zero Degree & the glass slide is parallel to the optical axis. Switch on laser & place a Screen infront of Glass slide so as we can observe the transmitted beam.

Now rotate the Rotational stage with glass slide at keep it at around 53° - 56° and observe transmitted & reflected beam.

Carefully rotate the polariser analyser & rotator by observing the two beams. It can be seen that at a particular degree (rotated polariser analyser & rotator) the reflected beam comes zero whereas trnsmitted light can still be seen. This is the Brewster angle for that glass plate. This method is used to partially polarise a laser beam .

Only when the beam is partially polarised, you can observe the Brewster angle of a particular material.