ME557 Lab experiment #1

Objectives:

1. To measure index of refraction of the following solid and liquid:
   (a) lime glass
   (b) Acrylic (plexiglass)
   (c) water
   (d) photoresist
2. To deduce grating frequency based on measurement of the angular orientation of diffracted beams

Apparatus: Optical breadboards, HeNe lasers, specimens, position sensitive dectector

Procedure:

1. Turn on laser and making sure it is properly aligned to the center of position sensitive detector (write down the voltage, this will be your initial point)
2. To obtain measurements of refraction at incident angles of $\pm 15^{o}$, $\pm 45^{o}$ and $\pm 75^{o}$ for glass, acrylate, water and photoresist.
   Record your data on the attached data sheet.
3. To obtain measurements of refraction at incident angles of $\pm 15^{o}$, $\pm 45^{o}$ and $\pm 75^{o}$ from the two reflective grating.
   Record your data on the attached data sheet.

Results: Submit the following summary:

Page1: Name
Date experiment performed
Measured index of refraction for each material (average$\pm$ standard deviation)
Measured diffraction grating frequency (average$\pm$ standard deviation)
Page2- completed “refraction” and “diffraction” data sheets
Page 3- Find indices of refraction based on the lateral displacement you measured.
Find grating frequency based on measurement of the angular orientation of diffracted beams.

Refraction Experiment

Water

Angle of incident (o)	Lateral displacement (m)	Angle of incident (o)	Lateral displacement (m)
+15		+15	
+45		+45	
+75		+75	

Oil

Angle of incident (o)	Lateral displacement (m)	Angle of incident (o)	Lateral displacement (m)
+15		+15	
+45		+45	
+75		+75	

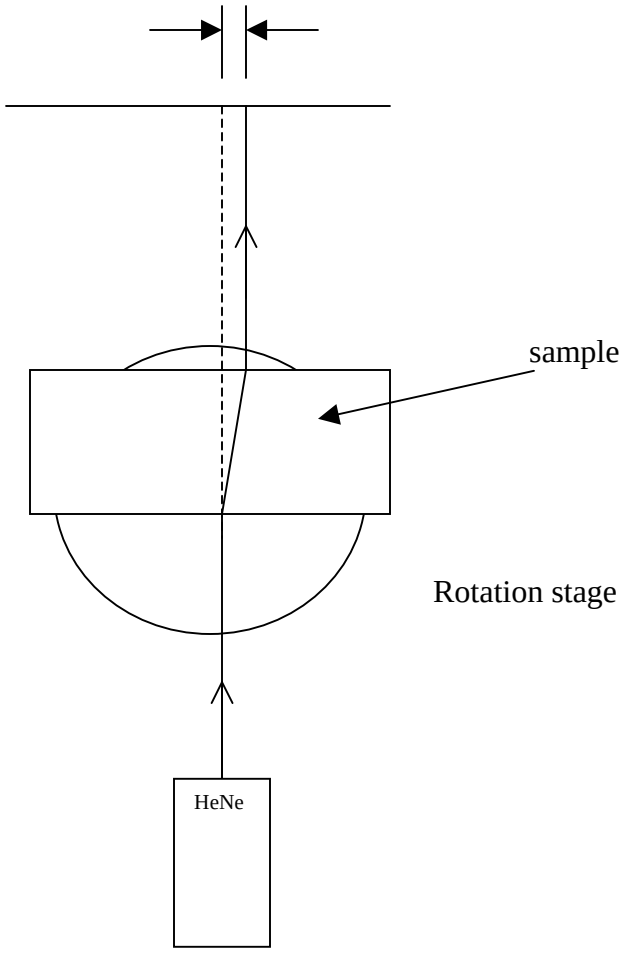
Pphotoresist

Angle of incident (o)	Lateral displacement (m)	Angle of incident (o)	Lateral displacement (m)
+15		+15	
+45		+45	
+75		+75	

Diffraction Experiment

	Diffraction Order					
Angle of incident (o)	order	angle	order	angle	order	angle
0	-1		0		1	
+15	-1		0		1	
-15	-1		0		1	
+45	-1		0		1	
-45	-1		0		1	
+75	-1		0		1	
-75	-1		0		1	

Refraction experiment setup



Diffraction experiment setup