Moiré Deflectometry

**Background:** Review OPTI 515R notes at

http://www.visualopticslab.com/OPTI515L/Background/MoireDeflectometry.pdf

**Introduction:** Moiré Deflectometry is a non-interferometric technique assessing the power of a lens. The test involves creating a low frequency Moiré pattern between two periodic patterns which are rotated slightly with respect to one another. The Moiré pattern is imaged by a lens at a fixed distance onto a camera sensor. When a lens of unknown power is placed between the imaging lens and the Moiré pattern, the pattern as viewed from the camera sensor will appear to rotate. From the geometry of the system, the unknown lens power can be calculated.

**Moiré Pattern**

1. Measure the period of the square wave grating pattern.
2. Place the transparent square wave pattern on one side of the acrylic plate. Orient it so that the lines are vertical.
3. Place the white square wave pattern on the back of the acrylic plate. Rotate this pattern and observe the Moiré pattern. Use the protractor to measure the angle between the two gratings.
4. Set up the camera and imaging lens to look at fringes. How does the pattern compare to the theoretical values. How does the fringe orientation change when the magnification of the imaging system is changed? How does having solid acrylic separating the two gratings affect the calculations?

**Spherical Power Measurement**

5. Adjust the camera system so that a roughly 2 inch region of the fringe pattern is seen. Rotate the white pattern so that there are roughly 5-10 fringes across the field of view. Place a spherical lens against the front grating. How does the orientation of the fringes change? How does this compare to the theoretical calculation? Repeat this process for a range of powers from -20D to 20D. Plot the predicted powers based on the fringe orientation and the theoretical values.
6. How does the fringe orientation change if the spherical lens is not against the first grating? Why?

**Cylindrical Power Measurement**

7. Adjust the camera system so two lenses can be examined side by side. Place a spherical and cylindrical lens of equivalent power next to one another. How do the fringe patterns relate? Rotate the axis of the cylinder lens through various orientations. How does the fringe pattern change? Plot the fringe angle and period as a function of cylinder axis and compare to the spherical lens.