

Optics 505L
Physical Optics Laboratory

Lab #12 -- Phase Shifting Interferometry

The purpose of this lab experiment is to become familiar with phase-shifting interferometry and a wavefront analysis program.

Preparation:

Notes on phase-measurement interferometry. Read Malacara's chapter on phase shifting.

Procedure:

- 1) Use a flat test piece in the optical mount.
- 2) Use the WYKO 6000 to obtain tilt fringes. Adjust the interferometer with the "align" option.
- 3) Measure the quality of the flat with the interferometer, and printout data to determine the peak-to-valley and rms wavefront.
- 4.) Investigate other forms of data output, like OTF and PSF, and relate it to your measurements.
- 5.) Repeat steps 1-4 with a precision ball and a concave mirror. You will need to have the TA change the reference sphere. **DO NOT CHANGE THE REFERENCE SPHERE WITHOUT THE TA.**
- 6) Play with the program as much as you like.
- 7) Have fun.

Questions:

- 1) How would you determine whether the sign of the measurement is correct?
- 2) What is the smallest fringe spacing that can be measured? Why?
- 3) If I count the number of fringes from a weak positive lens using the Twyman-Green interferometer, do I get the same number of fringes as I would with the Mach-Zehnder interferometer? If not, how many do I get?
- 4) How would you determine the repeatability of your measurement?
- 5) How would you determine the measurement accuracy? What precautions should be taken to do this?
- 6) How does the WYKO 6000 implement phase shifting?