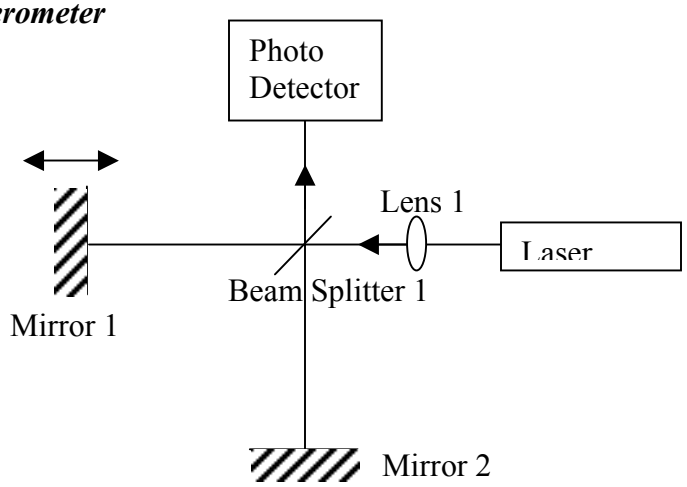
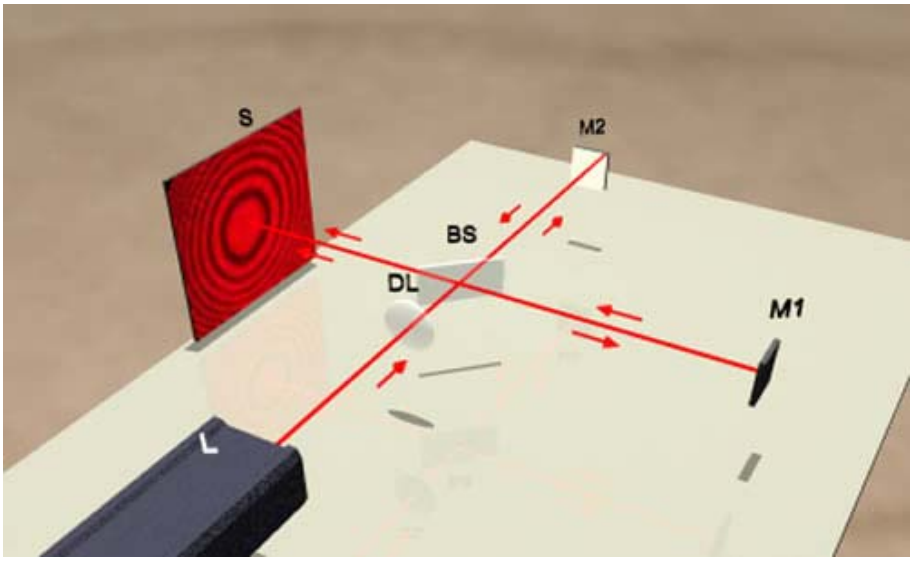
EN 232 Experimental Mechanics ***Laboratory III*** K.-S. Kim, March 9, 2004

Michelson Interferometer and Mach-Zehnder Interferometer

Michelson Interferometer



Introduction



http://www.3dimagery.com/michelsn.html

The Michelson interferometer set up is shown above. Objectives of the experiments are to observe the sensitivity of the Michelson displacement interferometer and to measure the wave length of the laser light source.

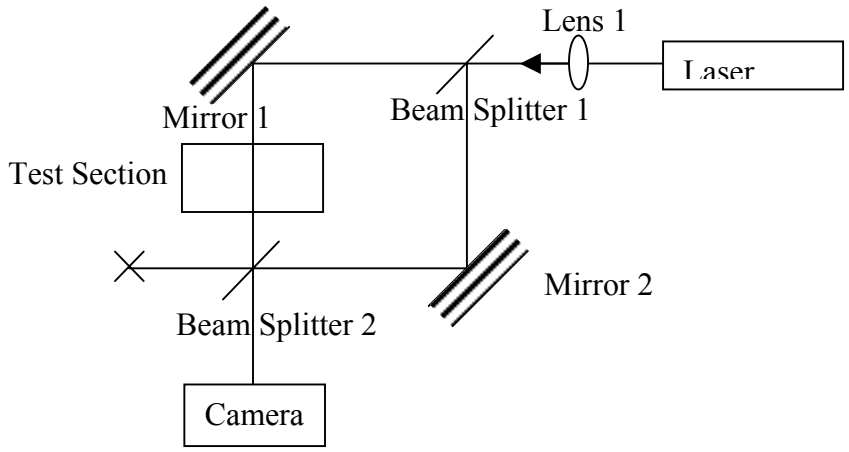
Perform the experiment as follows.

(1) Align the interferometer to observe the Bull's eye pattern of the interference as shown on the screen of the figure, adjusting the beam divergence with the lens location, and the path length difference between the two paths. Observe the sensitivity of the fringe motion by tapping the table gently.

(2) Measure the diameters of the first two bright (or dark) rings of the Bull's eye as you move the mirror 1 with a micrometer. Find the wave length of the light source with experimental data.

(3) Put a photo detector at the center of the Bull's eye and observe the light intensity variation on an oscilloscope and count the number of fringes as you move the mirror 1 for a known distance. Find the wave length of the light source with this experimental data as well and compare the values with that obtained by the procedure (2).

Mach-Zehnder interferometer



Set up the Mach Zehnder interferometer as shown above and perform the experiments as follows.

(1) Put a glass of thickness t in the test section. Then, rotate the glass with respect to a vertical axis and observe the change of the fringe numbers. Use the data to calculate the index of refraction.

(2) Put a soldering iron in the test section and observe the fringes caused by the convection current. Estimate the temperature of the surface of the iron using the experimental data.

Lab report is due by March 26, 2004.