Physics 108 Assignment#5 (due on 5/5/14)

Reading materials:

Pedrotti 3rd Edition: **Chapter 11:** 11-1 through 11-4
Lecture Notes: pp. 49 - 62

Homework: (Pedrotti 3rd Edition)

1. 11-1
2. 11-3
3. 11-4
4. 11-5
5. 11-10
6. 11-11
7. 11-13
8. Show explicitly that the spatial resolution of a small object y_0 viewed by a microscope with an objective of focal length f_0 and an effective diameter d (determined by the Entrance pupil E_nP, remember that?) is given by $\delta y_0 = 1.22 * (f_0 / d) * \lambda$.

OSLO homework (Due 6/3/09):

OSLO-1 Find the optimized meniscus lens for a landscape camera with BFL (distance between the last refraction surface to the image plane) = 90 mm. List the surface data of your lens and show the graphic of the ray drawing of your lens.

OSLO-2 Solve 2-34 with OSLO and compare the result with the algebraic formulae $(n_1/S_0)+(n_2/S_i)=(n_2-n_1)/R$ obtained in paraxial approximation (optional). If you don't know how to input the refractive index of 4/3 = 1.333 (water), you can either use refractive index of glass (BK7) or ask Instructor on how to input such a parameter.

OSLO-4 Construct a microscope from two plano-convex lenses, one with a focal length of 16 mm as the objective lens, and the other with a focal length of 25 mm as the eye piece (magnifier). Assume that an object is positioned 17 mm from the objective lens,

(a) find the image plane after the objective for paraxial rays of an axial point;

(b) show that the image of an off-axis object point is distorted;

(c) find the location of the eye piece lens so that the virtual image plane afterward is at d_0 = 250 mm from the last surface of the eye piece lens (the image of the same off-axis object point is distorted still more);

(c) use a lens file *OSLO/Prm61/public/len/lib/WALKER/VisualSyst/100x microscope (6.7).len*, for a 100× microscope, and show that the image of a same off-axis object point is far less distorted.

OSLO-5 Use the lens specifications in 18-23 and OSLO to

(a) find the focal length of Proctor photographic lens;

(b) find the ABCD matrix for such a lens. Again ask Instructor if you cannot figure out how to input the listed refractive indices.