Physics 108 Assignment#6 (due on 5/12/14)

**Reading materials:**

*Pedrotti 3rd Edition:*

- **Chapter 11:** 11-1 through 11-6
- **Chapter 12:** 12-3, 12-4

**Lecture Notes:** pp. 54 - 67

**Homework:** (Pedrotti 3rd Edition)

1. When a single slit with width \( d \) is obliquely illuminated by a collimated optical beam with wavelength \( \lambda_0 \) at incidence angle \( \theta_{\text{inc}} \), show that the outgoing electric field as a function of angle \( \theta_{\text{out}} \) far from the slit is given by

\[
E(\theta_{\text{out}}) = E_{\text{inc}} \cos \left( \frac{2\pi n}{\lambda_0} \rho - \omega t \right) \left( \frac{d}{\sqrt{\rho \lambda_0}} \right) \left[ \sin \left( \frac{\pi d (\sin \theta_{\text{out}} - \sin \theta_{\text{inc}})}{\lambda_0} \right) \right]
\]

2. 11-15
3. 11-20
4. 12-4
5. 12-6

Assignment#3 (Due 5/12/14):

13. **Landscape Lens:** Perform the Introductory Exercise on Landscape Lens using OSLOEDU software. Show YOUR results by (1) displaying the starting “Surface Data” and “Lens Drawing” for paraxial rays and non-paraxial rays; and (2) displaying your optimized “Surface Data” and “Lens Drawing” for paraxial rays and non-paraxial rays. (You may also try the following condition for start: and “draw off”).

<table>
<thead>
<tr>
<th>OBJ</th>
<th>RADIUS</th>
<th>THICKNESS</th>
<th>APERTURE RADIUS</th>
<th>GLASS</th>
<th>SPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21.807957 V</td>
<td>4.000000</td>
<td>11.666830 S</td>
<td>BK7</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>27.7777778</td>
<td>12.647480 V</td>
<td>9.997114 S</td>
<td>AIR</td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td>--</td>
<td>155.058604 S</td>
<td>4.341641 ÅS</td>
<td>AIR</td>
<td>*</td>
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<tr>
<td>IMS</td>
<td>--</td>
<td>--</td>
<td>67.000000</td>
<td></td>
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</table>

14. 18-23 Use the lens specifications and OSLOEDU to (a) find the focal length of Proctor photographic lens and (b) find the ABCD matrix for such a lens.