Solutions to Optical Physics 030107

1-2

The second lens is Aperture Stop, AS, throughout the zooming (must be demonstrated someway). In the end positions the system focal length is 150mm and 50mm respectively. The size of the entrance pupil is determined by imaging lens 2 through lens 1, which gives the sizes 20mm resp 15mm. The f-numbers will be 6 and 3,3
Det är hela tiden den andra linsen som är AS (måste visas eller motiveras på ngt sätt)
I ändlägena är systemfokallängden 150mm (för d=30mm) resp 50mm (för d=50mm).

3

All wavelengths will experience a phase shift π because of reflection against denser medium. Condition for max gives

$$2nd\cos b = \frac{(2m+1)}{2}\lambda$$

m=1 for red light (620nm) gives an optical path difference of two wavelengths for red and 2,5 wavelengths for 496 nm, which is cyan (blue green)

$$d = \frac{1{,}5\lambda}{2\cdot 1{,}8\cos 23^\circ} = 280nm$$

4

In normal situation t looks like the pattern from a square grating i e the cover page of Hecht
If the web is skew the pattern will also be skew

5

At 0,90°, 180°. 270° nothing is transmitted (in both cases)
For positions in between the quarter wave plate gives 0,25 and the half wave plate 0,5.

6

The coherence function can be written

$$\gamma = 0{,}8\exp(ik\Delta L)\{1+0.25[\exp(i\Delta k\Delta L)]\} = \frac{\exp(ik\Delta L)}{1{,}25}\left\{1+0{,}25\cos\frac{2\pi\Delta f\Delta L}{c}\right\}$$

Where the factor inside the largest parenthesis is the visibility, V

$$V = \left(0{,}8+0{,}2\cos\frac{\pi\Delta L}{L_{las}}\right)$$

Varying betwenn 1 and 0,6