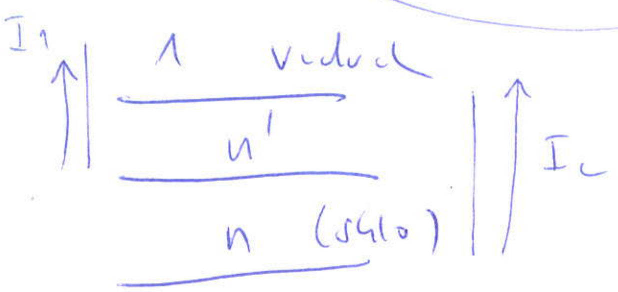
1

# Tenké vrstvy




$$I \sim \left(\frac{n_2 - n_1}{n_2 + n_1}\right)^2$$

$I_1 = I_2 \quad \Rightarrow$

$$\frac{n - n'}{n + n'} = \frac{n' - 1}{n' + 1}$$

$$\frac{(n-n')(n'+1) - (n'-1)(n+n')}{(n+n')(n'+1)} = 0$$

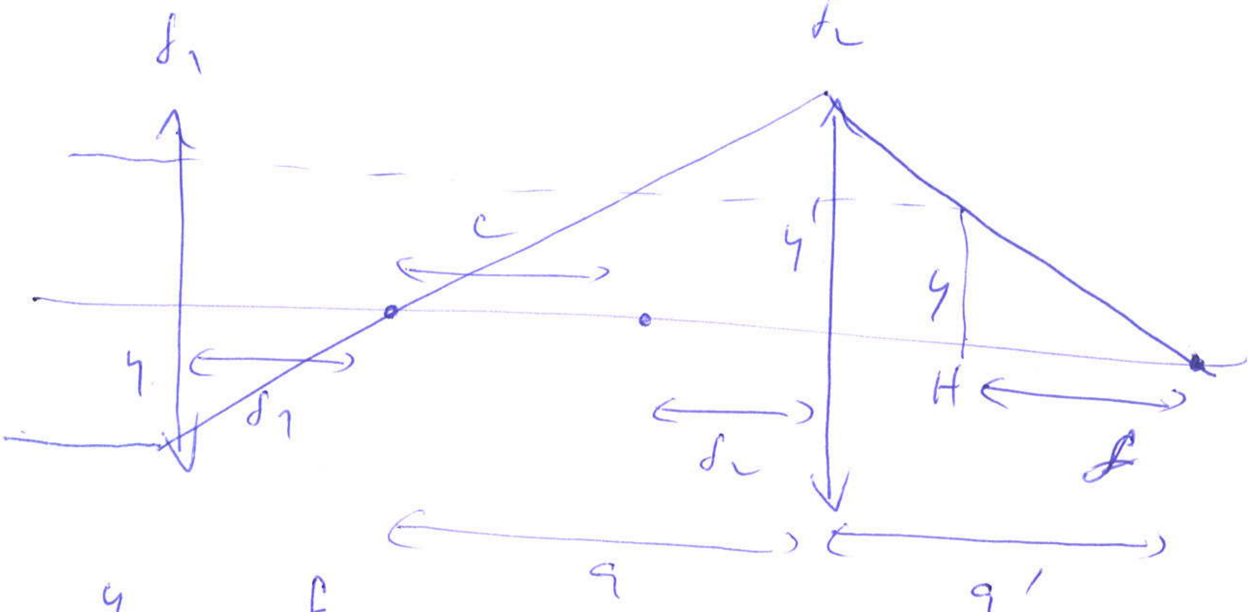
$$\Rightarrow \quad \cancel{nn'} + n - n'^2 - \cancel{n'} - \cancel{nn'} - n'^2 + n + \cancel{n'} = 0$$

$$2n = 2n'^2$$

$$\boxed{n' = \sqrt{n}}$$

# Huygens okulár

1




$$\frac{y}{y'} = \frac{f}{a'}$$

$$\frac{1}{a} + \frac{1}{a'} = \frac{1}{f_2}$$

$$\frac{y}{y'} = \frac{f_1}{f_2 + c}$$

$$\frac{1}{a'} = \frac{1}{f_2} - \frac{1}{f_2 + c}$$

$$\frac{f}{a'} = \frac{f_1}{f_2 + c}$$

$$f\left(\frac{1}{f_2} - \frac{1}{f_2 + c}\right) = \frac{f_1}{f_2 + c}$$

$$\frac{1}{f} = \frac{\frac{1}{f_2} - \frac{1}{f_2 + c}}{\frac{f_1}{f_2 + c}} = \frac{\frac{f_2 + c - \cancel{f_2}}{f_2(\cancel{f_2 + c})}}{\frac{f_1}{\cancel{f_2 + c}}} = \frac{c}{f_1 f_2}$$

$$c = d - f_1 - f_2 \Rightarrow \boxed{\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{d}{f_1 f_2}}$$

2

achromatizace:

$$\frac{d\left(\frac{1}{f}\right)}{dn} = 0$$

$$\frac{1}{f_1} = (n-1)\,c_1 \,, \quad \frac{1}{f_2} = (n-1)\,c_2$$

$$c_1 = \left(\frac{1}{R_1} - \frac{1}{R_2}\right), \quad c_2 = \left(\frac{1}{R_3} - \frac{1}{R_4}\right)$$

$$\frac{1}{f} = (n-1)c_1 + (n-1)c_2 - d(n-1)^2 c_1 c_2 \quad \Big/ \; \frac{d}{dn}$$

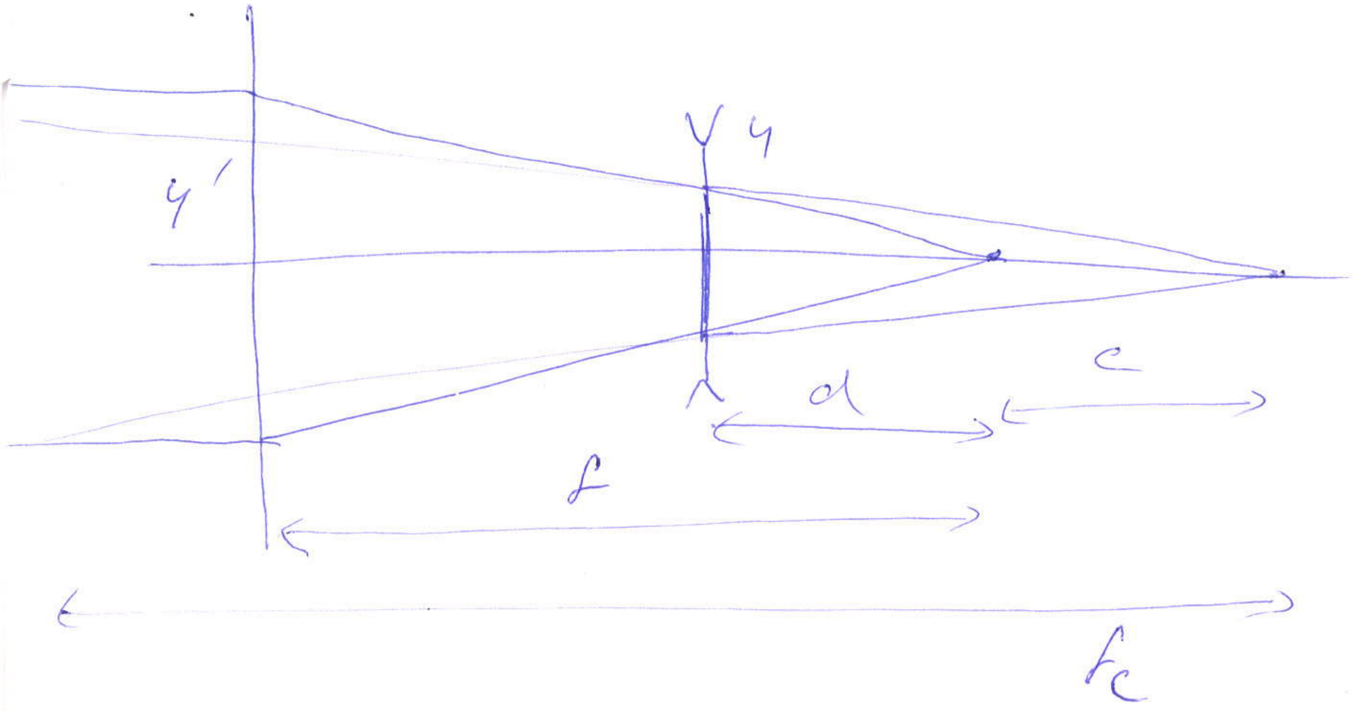
$$c_1 + c_2 - 2(n-1)c_1 c_2 d = 0$$

$$d = \frac{c_1 + c_2}{2(n-1)c_1 c_2}$$

$$d = \frac{1}{2(n-1)c_2} + \frac{1}{2(n-1)c_1}$$

$$\boxed{d = \frac{f_1 + f_2}{2}}$$

# Barlow




$$\frac{y}{y'} = \frac{d+c}{f_C} \quad , \quad \frac{y}{y'} = \frac{d}{f}$$

$$\frac{d+c}{f_c} = \frac{d}{f} \Rightarrow f_c = \frac{f}{d}(d+c)$$

$$-\frac{1}{d} + \frac{1}{c+d} = -\frac{1}{f_B} \Rightarrow c+d = \frac{1}{-\frac{1}{f_B} + \frac{1}{d}}$$

$$c+d = \frac{d\, f_B}{f_B - d}$$

$$f_c = \frac{f}{\cancel{d}} \frac{\cancel{d} \cdot f_B}{f_B - d} = f \underset{M_B}{\boxed{\frac{f_B}{f_B - d}}}$$

$$\boxed{d+c = f_2(M_B - 1)} \qquad \boxed{M_B = \frac{f_B}{f_B - d}}$$