

CVO

5.1 The principal powers of a reduced astigmatic eye are $+62.00\text{ D}$ in 180° and $+64.00\text{ D}$ in 90° . Eye has normal emmetropic length, a pupil of 6 mm , and it views a distant point.

Calculate:

- Position of the two focal lines and the disc of least confusion,
- The lengths of the two focal lines and the diameter of the disc of least confusion,
- The dimensions of the blurred patch on the retina.

Lösning

$$F_{180} = 62.00\text{ D}$$

$$F_{90} = 64.00\text{ D}$$

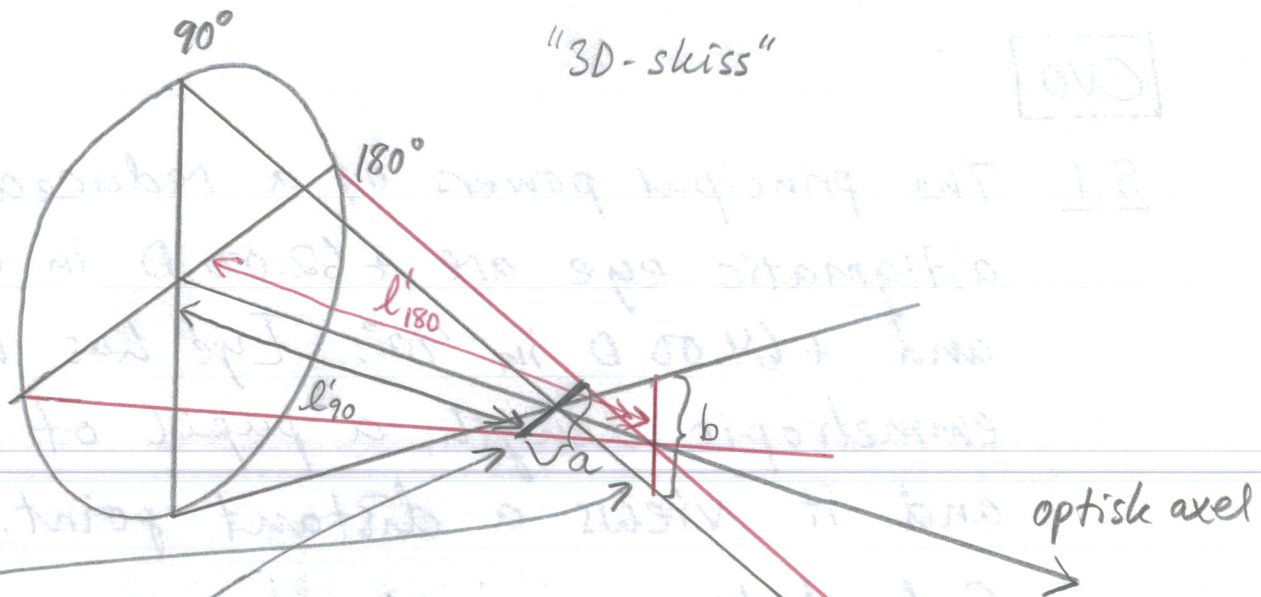
$$K' = 60.00\text{ D}$$

$$g = 6\text{ mm}$$

$$d = -\infty$$

$$n' = 1.336$$

"3D-skiss"



Horisontell fokallinje ges av F_{90} !

$$L'_{90} = L + F_{90} = 0 + F_{90} = 64.00 \text{ D}$$

$$l'_{90} = \frac{n'}{L'_{90}} = \frac{1.336}{64} \text{ m} \approx 0.02088 \text{ m} = \underline{\underline{20.88 \text{ mm}}}$$

Vertikal fokallinje ges av F_{180} !

Som ovan:

$$l'_{180} = \frac{1.336}{62} \text{ m} \approx 0.02155 \text{ m} = \underline{\underline{21.55 \text{ mm}}}$$

Längd av resp. fokallinje:

$$a = \frac{g \cdot \text{Ast}}{L'_{90}}, \quad \text{Ast} = F_{90} - F_{180} \quad (5.4)$$

$$a = \frac{6.2}{64} \text{ mm} \approx \underline{\underline{0.1875 \text{ mm}}}$$

$$b = \frac{6.2}{62} \text{ mm} \approx \underline{\underline{0.1935 \text{ mm}}}$$

Position av minsta spridningscirkel ges av

$$L'_z = \frac{L'_{90} + L'_{180}}{2} = \frac{64 + 62}{2} \text{ D} = 63 \text{ D}$$

$$l'_z = \frac{1.336}{63} \text{ m} \approx 0.02121 \text{ m} = \underline{\underline{21.21 \text{ mm}}}$$

Diameter på minsta spridningscirkel ges av

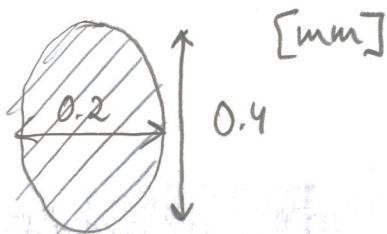
$$z = \frac{g A_{st}}{L'_{90} + L'_{180}} = \frac{6.2}{64 + 62} \text{ mm} \approx \underline{\underline{0.0952 \text{ mm}}}$$

Diameter på näthinnan:

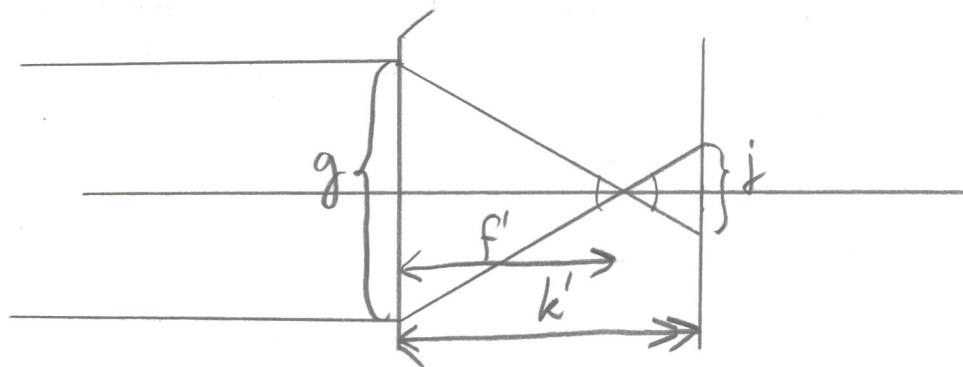
$$\hat{z} = g \left(\frac{F' - K'}{K'} \right) \quad (4.17)$$

$$\hat{z}_{90} = 6 \left(\frac{64 - 60}{60} \right) \text{ mm} \approx \underline{\underline{0.4 \text{ mm}}} \quad (\text{vertikal})$$

$$\hat{z}_{180} = 6 \left(\frac{62 - 60}{60} \right) \text{ mm} \approx \underline{\underline{0.2 \text{ mm}}} \quad (\text{horisontell})$$



Härledning av (4.17):



Likformighet:

$$\frac{\hat{z}}{g} = \frac{k' - f'}{f'} = \frac{\frac{D'}{K'} - \frac{D'}{F'}}{\frac{D'}{F'}} = \frac{\frac{F' - K'}{K'F'}}{\frac{1}{F'}} = \frac{F' - K'}{K'}$$

$$\hat{z} = g \left(\frac{F' - K'}{K'} \right) \quad \text{v.s.v}$$

Huvudsnittsstyrkor och glasögonrecept:

Ex1) $F_{90}=+2,00$ D, $F_{180}=-1,00$ D motsvarar glasögonreceptet: $+2,00$ D/ $-3,00$ D x 90

Ex2) $F_{25}=-1,50$ D, $F_{115}=-1,00$ D motsvarar glasögonreceptet: $-1,00$ D/ $-0,50$ D x 115

Ex3) $F_{50}=+6,50$ D, $F_{140}=+8,50$ D motsvarar glasögonreceptet: $+8,50$ D/ $-2,00$ D x 140

Ex4) $F_{25}=-3,00$ D, $F_{115}=+0,50$ D motsvarar glasögonreceptet: $+0,50$ D/ $-3,50$ D x 115

Ex5) $F_{90}=+2,00$ D, $F_{180}=\pm 0,00$ D motsvarar glasögonreceptet: $+2,00$ D/ $-2,00$ D x 90

Ex6) $F_{10}=-0,75$ D, $F_{100}=\pm 0,00$ D motsvarar glasögonreceptet: $\pm 0,00$ D/ $-0,75$ D x 100