

Rumus dan perhitungan pencarian indeks bias penelitian dengan hukum snellius :

$$\frac{\sin i}{\sin r} = \frac{n_u}{n_f}$$

$$n_f = \frac{n_u \sin r}{\sin i} \quad (1)$$

Untuk mencari sudut r

$$\tan r = \frac{y}{l} \rightarrow r = \arctan \frac{y}{l} \quad (2)$$

$$\text{Dimana } y = d - x \quad (3)$$

Untuk mencari x

$$X = h \tan i \quad (4)$$

Maka persamaan 3 menjadi

$$Y = d - h \tan (i) \quad (5)$$

Sehingga persamaan 1 menjadi :

$$n_f = \frac{n_u \sin r}{\sin i} = \frac{n_u \sin (\arctan \frac{y}{l})}{\sin i} \quad (6)$$

Atau

$$n_f = \frac{n_u \cdot y / \sqrt{l^2 + y^2}}{\sin i} \quad (6b)$$

$$n_f = \frac{n_u \cdot y}{\sin i \sqrt{l^2 + y^2}} \quad (6b)$$

Jadi persammaan yang di gunakan disini yaitu persamaan (5) dan persamaan (6a atau 6b)

Jadi :

Diketahui :

$$\tan 40 = 0,839$$

$$\sin 40 = 0,642$$

$$d = 11 \text{ cm}$$

$$h = 7 \text{ cm}$$

$$L1 = 1,5 \text{ cm}$$

$$L5 = 3,5 \text{ cm}$$

$$L2 = 2 \text{ cm}$$

$$L6 = 4 \text{ cm}$$

$$L3 = 2,5 \text{ cm}$$

$$L7 = 4,5 \text{ cm}$$

$$L4 = 3 \text{ cm}$$

$$L8 = 5 \text{ cm}$$

Maka :

$$Y = d - h \tan (i)$$

$$= 11 - 7 \cdot \tan (i)$$

$$= 11 - 7 \cdot \tan 40$$

$$= 11 - 7 \cdot 0,839$$

$$= 11 - 5,873$$

$$= 5,127$$

- $l_1 = 1,5$

$$n_f = \frac{n_u \cdot y}{\sin i \cdot \sqrt{l^2 + y^2}}$$

$$= \frac{1 \cdot 5,127}{0,642 \cdot \sqrt{1,5^2 + 5,127^2}}$$

$$= \frac{5,127}{0,642 \cdot \sqrt{2,25 + 26,286}}$$

$$= \frac{5,127}{0,642 \cdot 28,536}$$

$$= \frac{5,127}{3,430} = 1,494$$

- $l_2 = 2 \text{ cm}$

$$n_f = \frac{n_u \cdot y}{\sin i \cdot \sqrt{l^2 + y^2}}$$

$$= \frac{1 \cdot 5,127}{0,642 \cdot \sqrt{2^2 + 5,127^2}}$$

$$= \frac{5,127}{0,642 \cdot \sqrt{4 + 26,286}}$$

$$= \frac{5,127}{0,642 \cdot 30,286}$$

$$= \frac{5,127}{3,533} = 1,452$$

- $l_3 = 2,5 \text{ cm}$

$$n_f = \frac{n_u \cdot y}{\sin i \cdot \sqrt{l^2 + y^2}}$$

$$= \frac{1 \cdot 5,127}{0,642 \cdot \sqrt{2,5^2 + 5,127^2}}$$

$$= \frac{5,127}{0,642 \cdot \sqrt{6,25 + 26,286}}$$

$$= \frac{5,127}{0,642 \cdot 32,536}$$

$$= \frac{5,127}{3,662} = 1,400$$

- $l_4 = 3 \text{ cm}$

$$\begin{aligned} n_f &= \frac{n_u \cdot y}{\sin i \cdot \overline{l^2 + y^2}} \\ &= \frac{1 \cdot 5,127}{0,642 \cdot \overline{3^2 + 5,127^2}} \\ &= \frac{5,127}{0,642 \cdot \overline{9 + 26,286}} \\ &= \frac{5,127}{0,642 \cdot \overline{35,286}} \\ &= \frac{5,127}{3,814} = 1,345 \end{aligned}$$

- $l_5 = 3,5 \text{ cm}$

$$\begin{aligned} n_f &= \frac{n_u \cdot y}{\sin i \cdot \overline{l^2 + y^2}} \\ &= \frac{1 \cdot 5,127}{0,642 \cdot \overline{3,5^2 + 5,127^2}} \\ &= \frac{5,127}{0,642 \cdot \overline{12,25 + 26,286}} \\ &= \frac{5,127}{0,642 \cdot \overline{38,536}} \\ &= \frac{5,127}{3,980} = 1,287 \end{aligned}$$

- $l_6 = 4 \text{ cm}$

$$\begin{aligned} n_f &= \frac{n_u \cdot y}{\sin i \cdot \overline{l^2 + y^2}} \\ &= \frac{1 \cdot 5,127}{0,642 \cdot \overline{4^2 + 5,127^2}} \\ &= \frac{5,127}{0,642 \cdot \overline{16 + 26,286}} \\ &= \frac{5,127}{0,642 \cdot \overline{42,286}} \\ &= \frac{5,127}{4,174} = 1,228 \end{aligned}$$

- $l_7 = 4,5 \text{ cm}$

$$\begin{aligned} n_f &= \frac{n_u \cdot y}{\sin i \cdot \overline{l^2 + y^2}} \\ &= \frac{1 \cdot 5,127}{0,642 \cdot \overline{4,5^2 + 5,127^2}} \\ &= \frac{5,127}{0,642 \cdot \overline{20,25 + 26,286}} \\ &= \frac{5,127}{0,642 \cdot \overline{46,536}} \\ &= \frac{5,127}{4,379} = 1,170 \end{aligned}$$

- $l_8 = 5 \text{ cm}$

$$n_f = \frac{n_u \cdot y}{\sin i \cdot \sqrt{l^2 + y^2}}$$

$$= \frac{1 \cdot 5,127}{0,642 \cdot \sqrt{5^2 + 5,127^2}}$$

$$= \frac{5,127}{0,642 \cdot \sqrt{25 + 26,286}}$$

$$= \frac{5,127}{0,642 \cdot 51,286}$$

$$= \frac{5,127}{4,597} = 1,115$$