Prisma

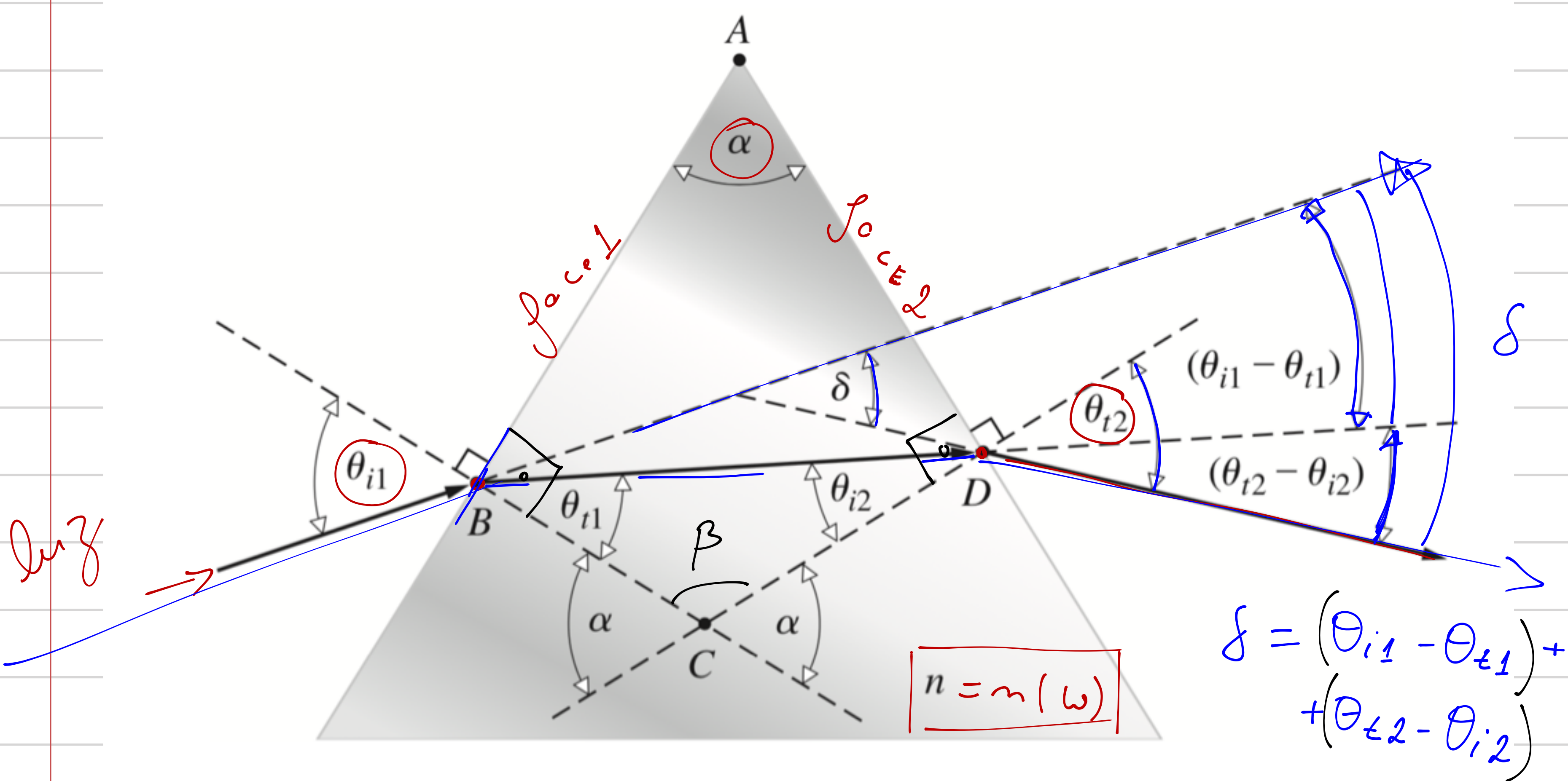


Figure 5.66 Geometry of a dispersing prism.

$\alpha + \beta = 180°$ $\qquad$ $\theta_{t1} + \theta_{i2} + \beta = 180$

θ_{i1} = ângulo de incidência na face 1

θ_{t2} = " de transmissão " " 2

α = " " abertura do prisma

→ 2 refrações nas faces

$\theta_{t1} + \theta_{i2} + \cancel{180} - \alpha = \cancel{180}$

$\boxed{\alpha = \theta_{t1} + \theta_{i2}}$

$\boxed{n \rightarrow \alpha, \delta, \theta_{i1}, \theta_{t2}}$

$\boxed{\delta = (\theta_{i1} - \theta_{t1}) + (\theta_{t2} - \theta_{i2})}$

para: a primeira face

$n_a \operatorname{Sen} \theta_{i1} = n_p \operatorname{Sen} \theta_{t1}$

$n_a = 1$

$\operatorname{Sen} \theta_{i1} = n_p \operatorname{Sen} \theta_{t1}$

a segunda face

$n_p \operatorname{Sen} \theta_{i2} = n_a \operatorname{Sen} \theta_{t2}$

$n_p \operatorname{Sen} \theta_{i2} = \operatorname{Sen} \theta_{t2}$

$$\theta_{t2} = \operatorname{Sen}^{-1}\left[n_p \operatorname{Sen} \theta_{i2}\right]$$

$$\alpha = \theta_{t1} + \theta_{i2}$$

$$\theta_{i2} = (\alpha - \theta_{t1})$$

$$\theta_{t2} = \operatorname{Sen}^{-1}\left[n_p \operatorname{Sen}(\alpha - \theta_{t1})\right.$$

$$\operatorname{Sen}(a-b) = \operatorname{Sen} a \operatorname{Cos} b - \operatorname{Sen} b \operatorname{Cos} a$$

$$\operatorname{Sen}(\alpha - \theta_{t1}) = \operatorname{Sen}\alpha \operatorname{Cos}\theta_{t1} - \operatorname{Sen}\theta_{t1} \cdot \operatorname{Cos}\alpha$$

$$\operatorname{Cos}^2 a + \operatorname{Sen}^2 a = 1$$

$$\operatorname{Cos}^2 \theta_{t1} = 1 - \operatorname{Sen}^2 \theta_{t1}$$

$$= \operatorname{Sen}^{-1}\left[\cancel{n_p} \operatorname{Sen}\alpha \left[n_p^2 - \underbrace{n_p^2 \operatorname{sen}^2 \theta_{t1}}_{\operatorname{Sen}^2 \theta_{i1}}\right]^{1/2} - \frac{\underbrace{n_p \operatorname{Sen} \theta_{t1}}}{\operatorname{Sen} \theta_{i1}} \cdot \operatorname{Cos}\alpha\right]$$

$$\boxed{\theta_{t2} = \operatorname{Sen}^{-1}\left[\operatorname{Sen}\underline{\alpha}\left(\underline{n_p}^2 - \operatorname{Sen}^2 \underline{\theta_{i1}}\right)^{1/2} - \operatorname{Sen}\underline{\theta_{i1}} \operatorname{Cos}\underline{\alpha}\right]}$$

$$\delta = \theta_{i1} + \theta_{t2} - \alpha$$

OK

ok

$$\Rightarrow \boxed{\delta = \delta(\theta_{i1}, \alpha, n_p)}$$

$$\boxed{\delta = \theta_{i1} - \alpha + \text{sen}^{-1}\left[\text{sen}\,\alpha\sqrt{n_p^2 - \text{sen}^2\theta_{i1}} - \text{sen}\,\theta_{i1}\cdot\cos\alpha\right]}$$

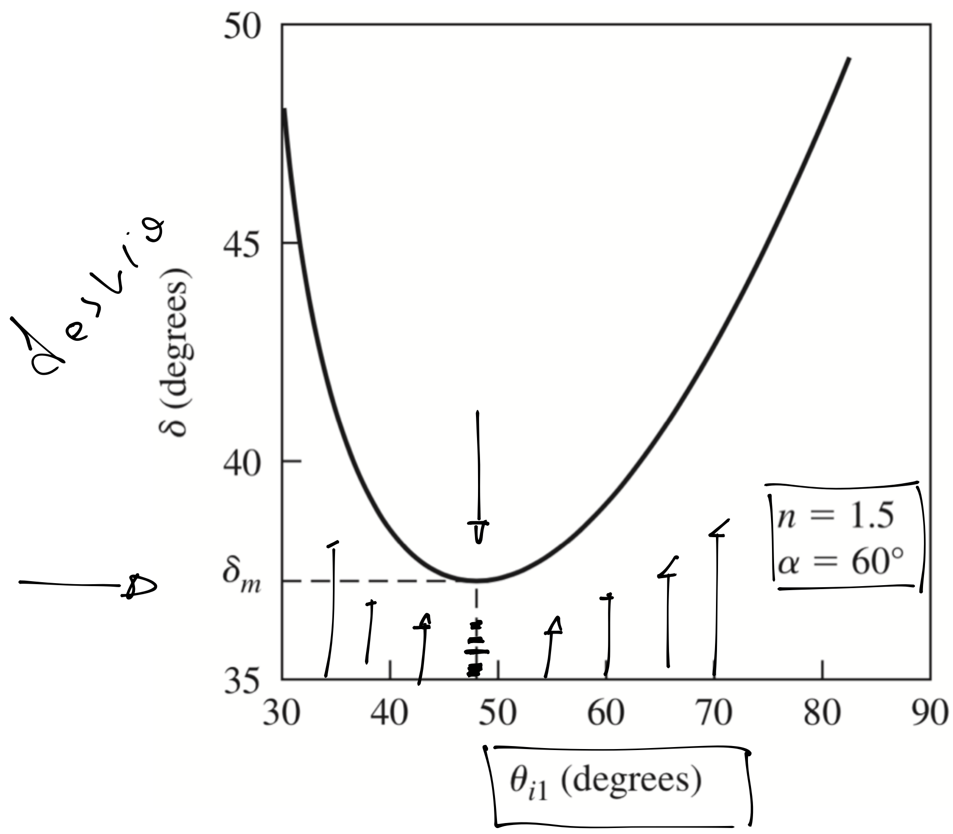


Figure 5.67 Deviation versus incident angle.

$$\boxed{\frac{d\delta}{d\theta_{i1}} = 0} \qquad \boxed{\theta_{i1} \longrightarrow \delta_m}$$

$\rightarrow$ $$\delta = \theta_{i1} + \theta_{t2} - \alpha$$

$$\frac{d\delta}{d\theta_{i1}} = 0 = 1 + \frac{d\theta_{t2}}{d\theta_{i1}} + 0 \qquad \boxed{\frac{d\theta_{t2}}{d\theta_{i1}} = -1}$$

$\rightarrow$ Lei de Snell nas duas faces

(1) $\text{sen}\,\theta_{i1} = n_p\,\text{sen}\,\theta_{t1} \Rightarrow \cos\theta_{i1}\,d\theta_{i1} = n_p\cos\theta_{t1}\,d\theta_{t1}$

(2) $n_p\,\text{sen}\,\theta_{i2} = \text{sen}\,\theta_{t2} \Rightarrow n_p\cos\theta_{i2}\,d\theta_{i2} = \cos\theta_{t2}\cdot d\theta_{t2}$

$\rightarrow$ $\alpha = \theta_{t1} + \theta_{i2}$ $\qquad \dfrac{d\alpha}{d\theta_{t1}} = 0 = 1 + \dfrac{d\theta_{i2}}{d\theta_{t1}}$

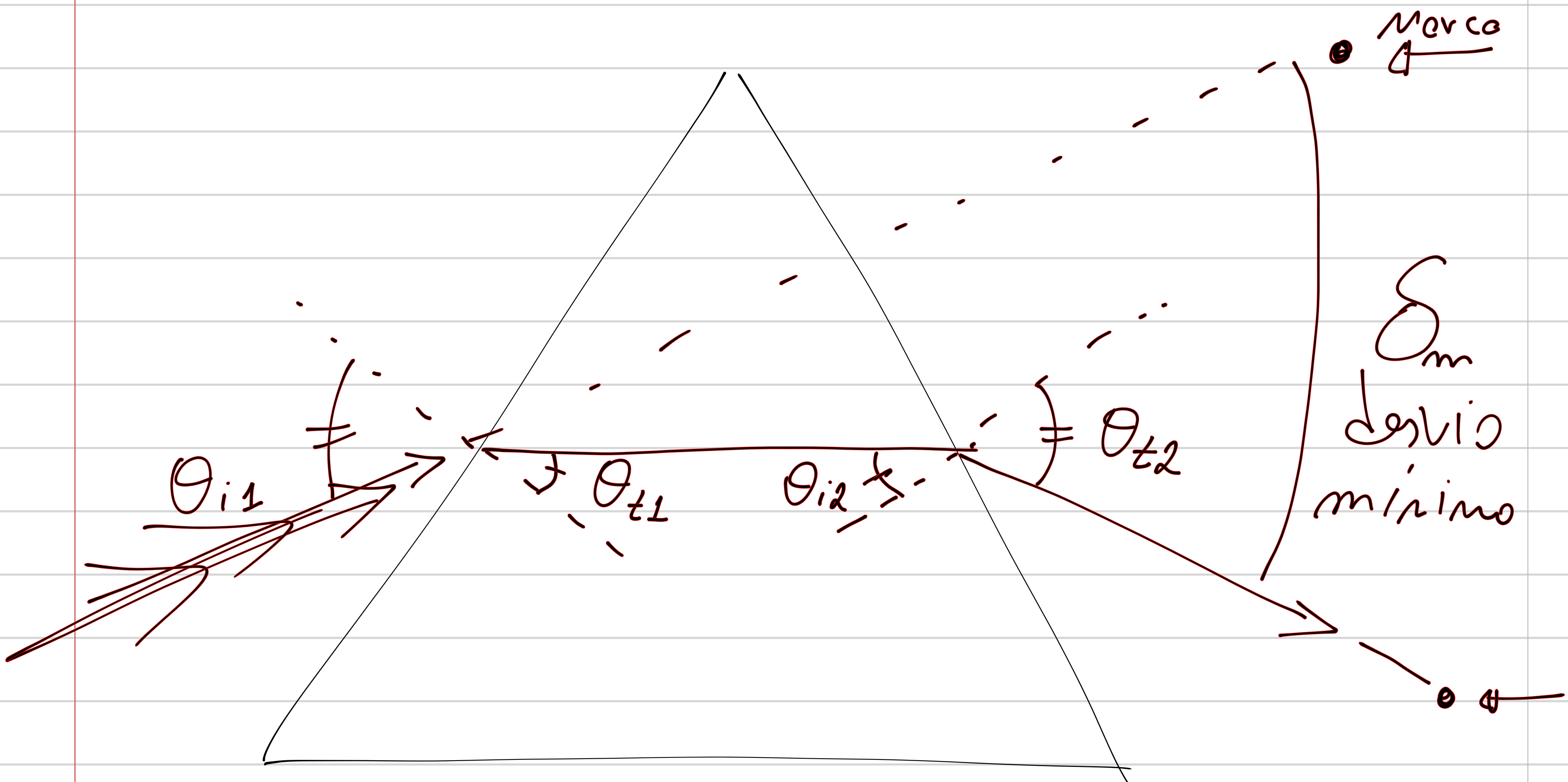
$$\boxed{\frac{d\theta_{i2}}{d\theta_{t1}} = -1}$$

$1 \div 2$

$$\frac{\cos\theta_{i1}}{\cos\theta_{t2}}\left(\frac{d\theta_{i1}}{d\theta_{t2}}\right)^{-1} = \frac{\cancel{n_p}\cos\theta_{t1}}{\cancel{n_p}\cos\theta_{i2}}\left(\frac{d\theta_{t1}}{d\theta_{i2}}\right)^{-1}$$

$$\boxed{\frac{\cos\theta_{i1}}{\cos\theta_{t2}} = \frac{\cos\theta_{t1}}{\cos\theta_{i2}}}$$

$$\boxed{\begin{array}{ll} \theta_{i1} = \theta_{t2} \rightarrow \text{externos} \\ \theta_{t1} = \theta_{i2} \rightarrow \text{internos} \end{array}}$$



$$\alpha = \theta_{t1} + \theta_{i2} = 2\theta_{t1} \qquad \boxed{\boxed{\theta_{t1}} = \frac{\alpha}{2}}$$

$$\delta_m = \theta_{i1} + \theta_{t2} - \alpha = 2\theta_{i1} - \alpha$$

$$\boxed{\theta_{i1}} = \frac{\delta_m - \alpha}{2}$$

Lei de Snell na face 1

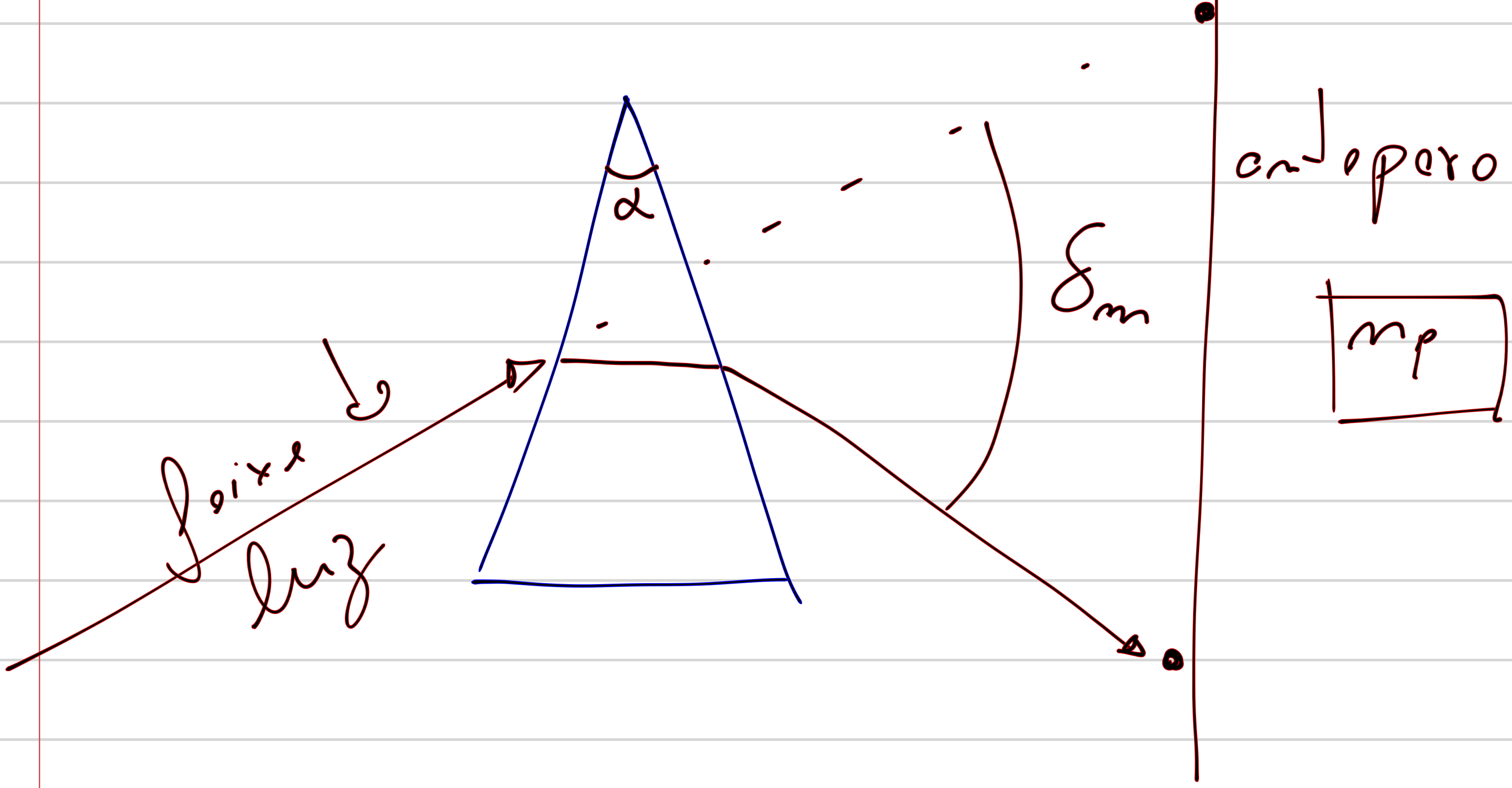
$$\text{sen}\,\theta_{i1} = n_p\,\text{sen}\,\theta_{t1}$$

$$\text{sen}\left[\left(\frac{\delta_m - \alpha}{2}\right)\right] = n_p\,\text{sen}\left(\frac{\alpha}{2}\right)$$

$$\boxed{n_p = \frac{\operatorname{sen}\left(\frac{\delta_m - \alpha}{2}\right)}{\operatorname{sen}\frac{\alpha}{2}}}$$

α, δ_m → Manuais

n_p → Calcula



$\delta_{Azul} > \delta_{vermelho}$