

$$\frac{n}{\sin \phi} = \frac{n_t}{\sin \theta}$$

$$\begin{aligned}\sin^2(\theta) + \cos^2 \theta &= 1 \\ \cos^2 \theta &= 1 - \sin^2 \theta \\ \sin^2(\theta) &= 1 - \cos^2 \theta\end{aligned}$$

$$\begin{aligned}\sin &= \frac{o}{s} \\ \cos &= \frac{a}{s}\end{aligned}$$

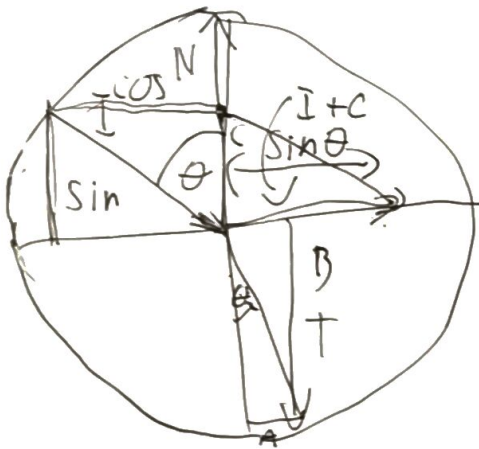
$$n^2 \sin^2 \theta = n_t^2 \sin^2 \phi$$

$$\begin{aligned}n^2(1 - \cos^2 \theta) &= n_t^2(1 - \cos^2 \phi) \\ n^2 - n^2 \cos^2 \theta &= n_t^2(1 - \cos^2 \phi)\end{aligned}$$

$$\begin{aligned}n^2 \cos^2 \theta - n^2 &= -n_t^2(1 - \cos^2 \phi) \\ \cos^2 \theta &= \frac{n^2 - n_t^2(1 - \cos^2 \phi)}{n^2}\end{aligned}$$

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{n_2}{n_1} \Rightarrow \frac{\sin \theta_2}{\sin \theta_1} = \frac{n_1}{n_2}$$

$$\begin{aligned}\cos^2 \theta - \frac{n^2}{n^2} &= -\frac{n_t^2(1 - \cos^2 \phi)}{n^2} \\ \cos^2 \theta &= 1 - \frac{n_t^2(1 - \cos^2 \phi)}{n^2}\end{aligned}$$



$$\vec{T} = \vec{A} + \vec{B}$$

$$\vec{A} = \cos \theta_2 \cdot -\vec{N}$$

$$\vec{B} = (\vec{I} + \vec{C}) / \sin \theta \cdot \sin \theta_2$$

$$\vec{T} = \cos \theta_2 \cdot -\vec{N} + (\vec{I} + \vec{C}) / \sin \theta \cdot \sin \theta_2$$

$$\vec{M} = (\vec{I} + \vec{C}) / \sin \theta$$

$$\vec{T} = -\vec{N} \cos \theta_2 + \vec{M} \sin \theta_2$$

$$\vec{T} = \frac{(\vec{I} + \vec{C}) \cdot \sin \theta_2}{\sin \theta_1} - \vec{N} \cos \theta_2$$

$$\vec{T} = \frac{\sin \theta_2}{\sin \theta_1} (\vec{I} + \vec{C}) - \vec{N} \cos \theta_2$$

$$\vec{T} = \frac{n_1}{n_2} (\vec{I} + \vec{C}) - \vec{N} \cos \theta_2$$

$$\vec{T} = \frac{n_1}{n_2} (C\vec{I} + \vec{C}) - \vec{N} \cos \theta_2$$

$$\cos^2 \theta + \sin^2 \theta = 1$$

$$\cos \theta = \sqrt{1 - \sin^2 \theta}$$

$$\vec{T} = \frac{n_1}{n_2} (C\vec{I} + \vec{C}) - \vec{N} \sqrt{1 - \sin^2 \theta_2}$$

$$= \frac{n_1}{n_2} (C\vec{I} + \vec{C}) - \vec{N} \sqrt{1 - \left(\frac{n_1}{n_2}\right)^2 \cdot \sin^2 \theta_1}$$

$$\sin \theta_2 = \frac{\sin \theta_1 \cdot n_1}{n_2}$$

$$= \frac{n_1}{n_2} \cdot \sin \theta_1$$

$$\vec{C} = \cos \theta_1 \cdot \vec{N}$$

$$\vec{T} = \frac{n_1}{n_2} (C\vec{I} + \cos \theta_1 \vec{N}) - \vec{N} \sqrt{1 - \left(\frac{n_1}{n_2}\right)^2 \cdot \sin^2 \theta_1}$$

$$\eta = \frac{n_1}{n_2}$$

$$C_1 = \cos \theta_1 = -\vec{I} \cdot \vec{N}$$

$$C_2 = \sqrt{1 - \left(\frac{n_1}{n_2}\right)^2 \cdot \sin^2 \theta_1} \rightarrow \sqrt{1 - \eta^2 \cdot (1 - \cos^2 \theta_1)}$$

$$\vec{T} = \eta \cdot (C\vec{I} + C_1 \vec{N}) - \vec{N} C_2$$

$$\vec{T} = \eta \vec{I} + \eta C_1 \vec{N} - \vec{N} C_2$$

$$\vec{T} = \eta \vec{I} + \vec{N} (\eta C_1 - C_2)$$

$$\vec{T} = \eta \vec{I} + \vec{N} (\eta C_1 - C_2)$$