

$$H = \frac{1}{\pi} \int_0^{\pi} \kappa_n(\theta) d\theta$$

By Euler formula $\kappa_n = \kappa_1 \cos^2 \theta + \kappa_2 \sin^2 \theta$

$$\begin{aligned} \frac{1}{\pi} \int_0^{\pi} \kappa_n(\theta) d\theta &= \frac{1}{\pi} \int_0^{\pi} (\kappa_1 \cos^2 \theta + \kappa_2 \sin^2 \theta) d\theta \\ &= \frac{1}{\pi} \int_0^{\pi} \kappa_1 \left(\frac{1 + \cos 2\theta}{2} \right) + \kappa_2 \left(\frac{1 - \cos 2\theta}{2} \right) d\theta = \frac{1}{\pi} \left[\pi \left(\frac{\kappa_1 + \kappa_2}{2} \right) \right] = H \end{aligned}$$