

## O2FRSOPS Graphs of Ratios of reflection coefficients

Reflection coefficients of Fresnel's formulas as function of angle of incidence for n and K. Real part and ratios of real parts are plotted.

Refractive indices, K values, and  $\theta$  are globally defined at the graphs.

$$i := \sqrt{-1}$$

Complex zrp, zzrp, zzzrp for parallel and zrs, zzrs, zzzrs for perpendicular case.

**K = 0**

$$zrp0(\theta) := \frac{\left(\frac{n2}{n1}\right) \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \sqrt{1 - \left[\left(\frac{n1}{n2}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\frac{n2}{n1} \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \sqrt{1 - \left[\left(\frac{n1}{n2}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$

$$zrs0(\theta) := \frac{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \left(\frac{n2}{n1}\right) \cdot \sqrt{1 - \left[\left(\frac{n1}{n2}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \left(\frac{n2}{n1}\right) \cdot \sqrt{1 - \left[\left(\frac{n1}{n2}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$

**K not 0**

$$zrp(\theta) := \frac{\left(\frac{n2 - i \cdot K}{n1}\right) \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \sqrt{1 - \left[\left(\frac{n1}{n2 - i \cdot K}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\frac{n2 - i \cdot K}{n1} \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \sqrt{1 - \left[\left(\frac{n1}{n2 - i \cdot K}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$

$$zrs(\theta) := \frac{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \left(\frac{n2 - i \cdot K}{n1}\right) \cdot \sqrt{1 - \left[\left(\frac{n1}{n2 - i \cdot K}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \left(\frac{n2 - i \cdot K}{n1}\right) \cdot \sqrt{1 - \left[\left(\frac{n1}{n2 - i \cdot K}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$

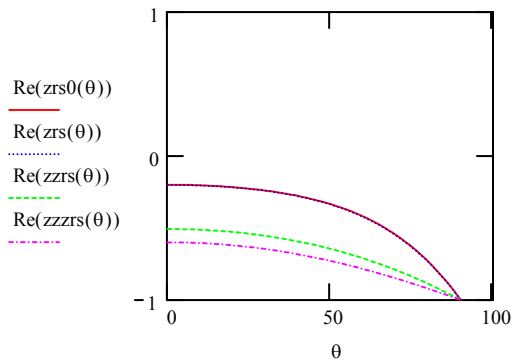
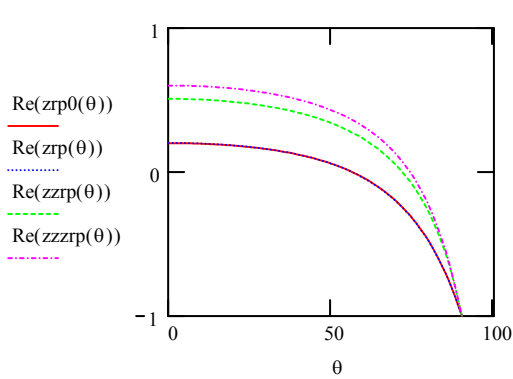
For different n and K

$$\text{zzrp}(\theta) := \frac{\left(\frac{\text{nn2} - i \cdot \text{KK}}{\text{n1}}\right) \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\frac{\text{nn2} - i \cdot \text{KK}}{\text{n1}} \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$

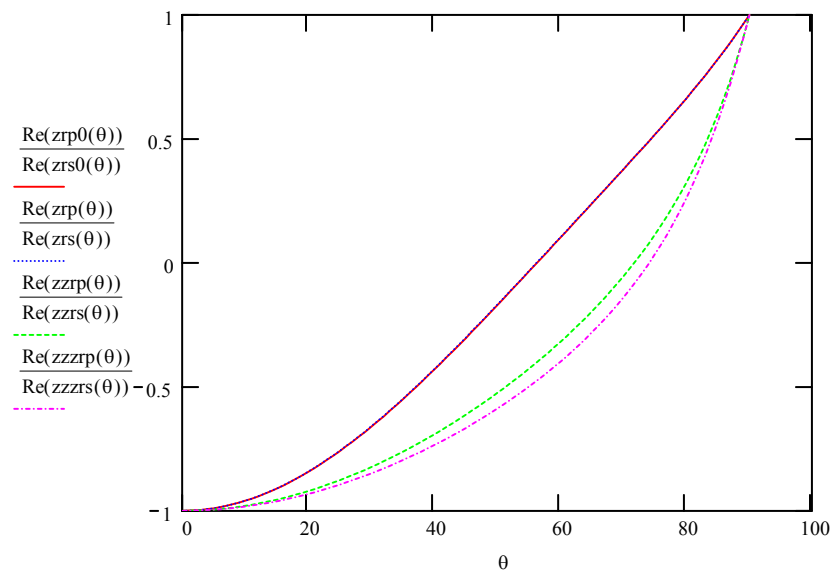
$$\text{zzrs}(\theta) := \frac{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \left(\frac{\text{nn2} - i \cdot \text{KK}}{\text{n1}}\right) \cdot \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \left(\frac{\text{nn2} - i \cdot \text{KK}}{\text{n1}}\right) \cdot \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$

$$\text{zzzrp}(\theta) := \frac{\left(\frac{\text{nn2} - i \cdot \text{KKK}}{\text{n1}}\right) \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KKK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\frac{\text{nn2} - i \cdot \text{KKK}}{\text{n1}} \cdot \cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KKK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$

$$\text{zzzrs}(\theta) := \frac{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) - \left(\frac{\text{nn2} - i \cdot \text{KKK}}{\text{n1}}\right) \cdot \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KKK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}{\cos\left(2 \cdot \frac{\pi}{360} \cdot \theta\right) + \left(\frac{\text{nn2} - i \cdot \text{KKK}}{\text{n1}}\right) \cdot \sqrt{1 - \left[\left(\frac{\text{n1}}{\text{nn2} - i \cdot \text{KKK}}\right) \cdot \sin\left(2 \cdot \frac{\pi}{360} \cdot \theta\right)\right]^2}}$$



Ratios: p/s



Ratios: s/p

$n1 \equiv 1$        $n2 \equiv 1.5$   
 $nn2 \equiv 3$      $\theta \equiv 0, 1..90$      $K \equiv .1$        $KK \equiv .5$      $KKK \equiv 2$

