Electromagnetism - Coefficients of Reflection and Transmission at the interface between two non-magnetic non-conducting media

Reflection and Transmission coefficients are obtained using:

$$R = \frac{S_R}{S_I} = \frac{E_{OR}^2}{E_{OI}^2}$$

$$T = \left(\frac{\varepsilon_{rel2}}{\varepsilon_{rel1}} \right)^{1/2} \frac{E_{OT}^2}{E_{OI}^2} \frac{\cos\theta_T}{\cos\theta_I} = \frac{n_2}{n_1} \frac{E_{OT}^2}{E_{OI}^2} \frac{\cos\theta_T}{\cos\theta_I}$$

Using Fresnel's equations with $\mu_1 = \mu_2 = \mu_o$ this gives two sets of results depending on whether 1) *E* is polarised normal to the plane of incidence or, 2) *E* is polarised parallel to the plane of incidence:

1) $$R_N = \left[\frac{\frac{n_1}{n_2}\cos\theta_I - \cos\theta_T}{\frac{n_1}{n_2}\cos\theta_I + \cos\theta_T} \right]^2$$

$$T_N = \frac{4\frac{n_1}{n_2}\cos\theta_I \cos\theta_T}{\left[\frac{n_1}{n_2}\cos\theta_I + \cos\theta_T \right]^2}$$

2) $$R_P = \left[\frac{-\cos\theta_I + \frac{n_1}{n_2}\cos\theta_T}{\cos\theta_I + \frac{n_1}{n_2}\cos\theta_T} \right]^2$$

$$T_P = \frac{4\frac{n_1}{n_2}\cos\theta_I \cos\theta_T}{\left[\cos\theta_I + \frac{n_1}{n_2}\cos\theta_T \right]^2}$$

In both cases $R + T = 1$