

Fresnel Equations

1. We showed in class, that when the incident electric field \vec{E}_i is parallel to the plane of incidence that , where $\alpha = \frac{\cos\theta_t}{\cos\theta_i}$ and $\beta = \frac{n_2}{n_1}$,

$$\frac{\tilde{E}_{or}}{\tilde{E}_{oi}} = \frac{\alpha - \beta}{\alpha + \beta} \quad \frac{\tilde{E}_{ot}}{\tilde{E}_{oi}} = \frac{2}{\alpha + \beta}$$

It can be shown, if \vec{E}_i is perpendicular to the plane of incidence that,

$$\frac{\tilde{E}_{or}}{\tilde{E}_{oi}} = \left| \frac{1 - \alpha\beta}{1 + \alpha\beta} \right| \quad \frac{\tilde{E}_{ot}}{\tilde{E}_{oi}} = \frac{2}{1 + \alpha\beta}$$

- (a) Make plots of the reflectance $R = \frac{I_r}{I_i}$ as a function of θ_i for both incident light polarizations for the case of reflection from a glass surface in air.
- (b) Interpret the graphs physically. What phenomenon do the graphs explain?