2.8B: Power of a Refracting Interface

Figure II.12 shows a refracting interface of radius of curvature r separating media of indices n_1 and n_2.

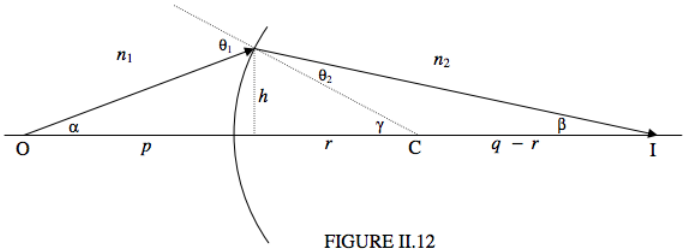

FIGURE II.12

I show a real object at O, a real image at I and the centre of curvature at C. Remember that angles are small and the “lens” is thin. We see that $h = \alpha p = \beta q = \gamma r$. By Euclid, $\theta_1 = \alpha + \gamma$ and $\theta_2 = \gamma - \beta$, and by Snell, $n_1\theta_1 = n_2\theta_2$. From these we obtain

$$\frac{n2}{q} = -\frac{n_1}{p} + \frac{n_2 - n_1}{r}. \tag{2.8B.1}$$

Thus the power is $\frac{n_2 - n_1}{r}$. The reader should try this for other situations (virtual object, virtual image, concave interface, and so on) to see that you always get the same result.