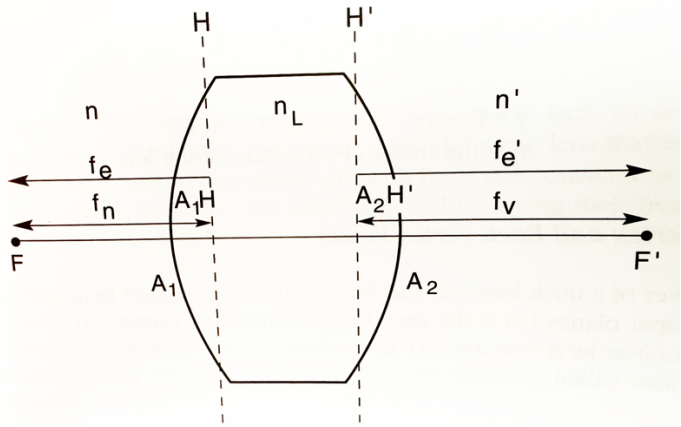
Thick Lens Optics

Equivalent Lenses

In an Equivalent Lens, all refraction is assumed to take place at the Principal Planes (H and H'). With an equivalent lens we do not consider the index of the lens itself.



(From Schwartz 2002)

Primary Equivalent Focal Length is measured from H to F

Secondary Equivalent Focal Length is measured from H' to F'

Front Vertex Focal Length (fv) is measured from A1 to F

Back Vertex Focal Length (f'v) is measured from A2 to F'

Equivalent Power

$$F_E = F_1 + F_2 - \frac{t}{n}(F_1 x\, F_{2)}$$

Front Vertex Power

$$F_v = \frac{F_2}{1 - \frac{t}{n}F_2} + F_1$$

Back Vertex Power

$$F'_v = \frac{F_1}{1 - \frac{t}{n}F_1} + F_2$$

Locating the Principal Planes

$$\overline{A_1H} = \frac{nt'F_2}{F_e}$$

$$\overline{A_2H'} = \frac{-nt'F_1}{F_e}$$