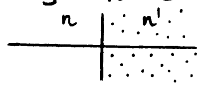
OPTICA GEOMETRICA

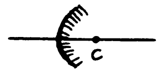
Ley de Refracción: $n \operatorname{sen} \alpha = n' \operatorname{sen} \alpha'$

Invariante de Abbe: $n\left(\frac{1}{r} - \frac{1}{s}\right) = n'\left(\frac{1}{r} - \frac{1}{s'}\right)$ o bien: $\frac{1}{s'} = \frac{n}{n'} \cdot \frac{1}{s} + \frac{n'-n}{n'r}$

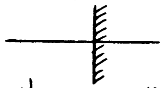
aplicación: – Superficie plana refractante: $s' = \frac{n'}{n} \cdot s$



– Espejo esférico: $\frac{1}{s} + \frac{1}{s'} = 2/r$



– Espejo plano: $s' = -s$



Aumentos:
– Lateral: $\beta' = y'_k / y_1$
– Angular: $\gamma' = \sigma'_k / \sigma_1$
– Axial: $\alpha' = \Delta z'_k / \Delta z_1$

$$\beta' = y'_k / y_1 = \frac{n_1}{n'_k} \cdot \frac{1}{\gamma'}$$

$$\beta' = \frac{y'}{y} = \frac{n}{n'} \cdot \frac{s'}{s} \qquad \beta' = \frac{n_1}{n'_k} \prod_1^k \frac{s'_i}{s_i}$$

Potencia:
– Objeto: $\varphi = 1/f$
– Imagen: $\varphi' = 1/f'$

Focales de una superficie:

$$f' = \frac{n'r}{n'-n} \qquad f = \frac{-nr}{n'-n}$$

Espejo: $f = f' = r/2$

$f = \frac{-n}{n'} f'$ (relación f y f')

Si $n = n'$ $\quad -f = f'$

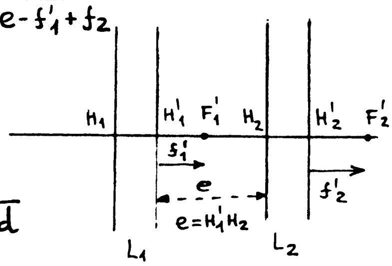
Optica paraxial: $-n/a + n'/a' = n'/f'$. Si $n = n' \longrightarrow -1/a + 1/a' = 1/f'$

Aumento: $\beta' = \frac{n}{n'} \cdot \frac{a'}{a}$

Acoplamiento de sistemas:

$$H'_2H' = \frac{ef'_2}{e - f'_1 + f_2} \qquad H_1H = \frac{ef_1}{e - f'_1 + f_2}$$

$$\varphi' = \varphi'_1 \cdot \frac{n_2}{n'_2} + \frac{1}{f'_2} - e\frac{1}{f'_1} \cdot \frac{1}{f'_2} \qquad f' = -\frac{f'_1 \cdot f'_2}{e - f'_1 + f_2}$$



Lentes:

$$H'_2H' = \frac{r_2 d}{n(r_1 - r_2) - (n-1)d} \qquad H_1H = \frac{r_1 d}{n(r_1 - r_2) - (n-1)d}$$

$$\frac{1}{f'} = (n-1)\left(\frac{1}{r_1} - \frac{1}{r_2}\right) + \frac{(n-1)^2}{n} \frac{d}{r_1 r_2}$$

Acoplamiento en aire:

$$H_1H = \frac{ef'_1}{f'_1 + f'_2 - e} \qquad H'_2H' = \frac{-ef'_2}{f'_1 + f'_2 - e} \qquad f' = \frac{f'_1 f'_2}{f'_1 + f'_2 - e}$$

Acoplamiento de lentes delgadas:

$$\frac{1}{f'} = (n-1)\left(\frac{1}{r_1} - \frac{1}{r_2}\right)$$

Focales: (lentes delgadas)