Notes of

Wyant College of Optical Sciences
University of Arizona

Nicolás Hernández Alegría

Preface

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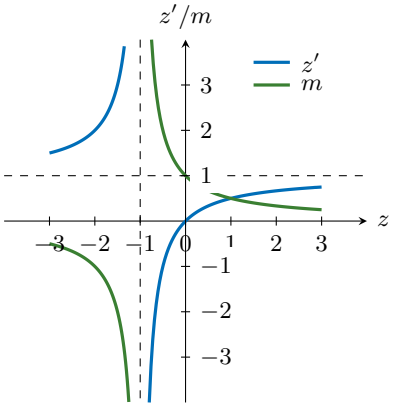
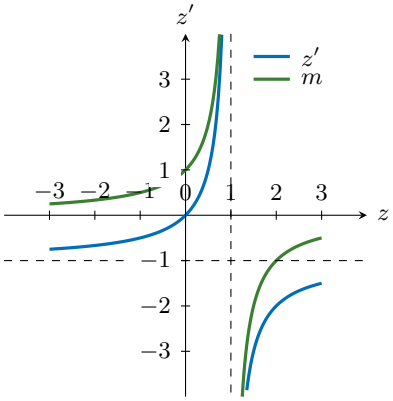
Formula sheet

z' and m curves



(a) $f > 0$



(b) $f < 0$

Useful formulas

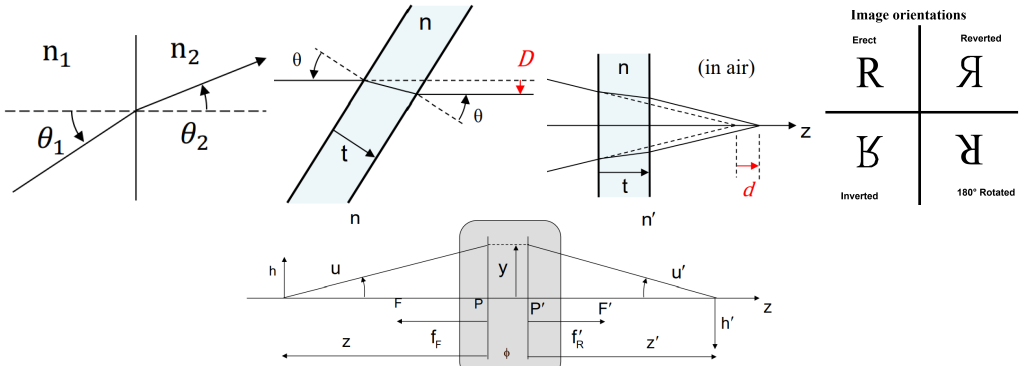
$\nu = \frac{V}{\lambda} = \frac{1}{T} = \frac{V}{\lambda}$	$n = \frac{c}{V}$	$\text{OPL} = \int_a^b \boldsymbol{n}(s) \cdot d\boldsymbol{s}$
$\frac{1}{z'} = \frac{1}{z} + \frac{1}{f}$	$m = \frac{z'}{z} = \frac{h'}{h}$	$m_{\text{total}} = \prod_i m_i$
$n_1 \sin\theta_1 = n_2 \sin\theta_2$	$\theta_2 = -\theta_1$	$\theta_i > \theta_c = \sin^{-1} n_2/n_1$
$d = \frac{n-1}{n} t$	$D \approx -t\theta\frac{n-1}{n}$	$\tau = t/n$

$(f > 0)\ |z| \gg f \implies z' \approx f \wedge m \approx f/z \wedge L = z' - z \approx -z$

$(f > 0)\ |z'| \gg f \implies z \approx -f \wedge m \approx -z'/f \wedge L \approx z'$

Afocal $m = \frac{h'}{h} = \frac{-f_2}{f_1}$	Keplerian $m < 0$	Galilean $m > 0$
$\phi = (n' - n)C$	$C = 1/R$	$n'u' = nu - y\phi$
$f = f_E = 1/\phi$	$f_F = -nf_E$	$f'_R = n' f_E$
$\frac{n'}{z'} = \frac{n}{z} + \phi$	$\frac{1}{f} = (n-1)(1/R_1 - 1/R_2)$	

$\frac{1}{f} = (n-1)[1/R_1 + 1/R_2 - \frac{(n-1)}{R_1 R_2}\frac{t}{n}]$



Key points

- n tells us how much light slows down compared to the vacuum. Frecuency doesnt change but wavelength does.
- Fermat's principle states that the path is given by $\text{OPL}'(\text{path}) = 0$.
- Reflection is a refraction with negative index $n' = -n$.

- Sign convention is: up-right, counter clockwise, vertex-radius of curvature.
- Parity change is preserved only for an **even** number of reflections. It is determined by looking backwards to the object.
- Wherever we have a roof mirror, denoted by a V, we must account for two reflections.
- Reduced thickness is the air-equivalent distance of a medium. All objects are therefore reduced.
- In negative lenses, the rear f'_R and front f_F focal points are reversed from positive lenses.
- The FOV $= 2$HFOV has several definitions, but all are related each other: solid arc can be measured.
- Newtonian equations measure the object and image distances from the focal planes, while Gaussian equations from the principal planes.
- Nodal points N and N' preserves magnification of 1.

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