

A7ASTSINS

Astigmatism on a single surface.

We have for the horizontal and vertical direction each an imaging equation which looks like the imaging equation for the single spherical surface, but the expressions depend on angles.

1. The vertical and horizontal imaging equations.

We have for horizontal $-1/x_o + n/x_{ih} = (n \cos\phi' - \cos\phi)/r$
and for vertical $-\cos\phi'^2/x_o + n\cos\phi'^2/x_{iv} = (n\cos\phi' - \cos\phi)/r$

using the law of refraction we can replace ϕ' by ϕ . We call $\cos(\phi') = c(\phi)$

2. For fixed n we make calculate $x_{ih}(\phi)$ as function of ϕ

$\phi := .1, .11 \dots .5$ $x_o := -100$ $r := 10$ $n := 1.2$

$$c(\phi) := \sqrt{1 - \frac{\sin\left(2 \cdot \pi \cdot \frac{\phi}{360}\right)^2}{n^2}}$$

$$x_{ih}(\phi) := \frac{n}{\left(\frac{n \cdot c(\phi) - \cos\left(2 \cdot \phi \cdot \frac{\pi}{360}\right)}{r} + \frac{1}{x_o} \right)}$$

3. For fixed n we make calculate $x_{iv}(\phi)$ as function of ϕ

$$x_{iv}(\phi) := \frac{n \cdot c(\phi)^2}{\left[\left(\frac{n \cdot c(\phi) - \cos\left(2 \cdot \phi \cdot \frac{\pi}{360}\right)}{r} \right) + \frac{\cos\left(2 \cdot \pi \cdot \frac{\phi}{360}\right)^2}{x_o} \right]}$$

4. Graph of the difference ASD for fixed n $\text{ASD}(\phi) := \text{xih}(\phi) - \text{xiv}(\phi)$

