A2SPASSS

Spherical aberration of a single refracting surface.
Definiton: Longitudinal spherical Aberration L.S.A. = xi - xiisph
Calculation of image point xi and corrected image point xiisph

All length in cm.

1. Calculation of xi(xo) for negative values of xo

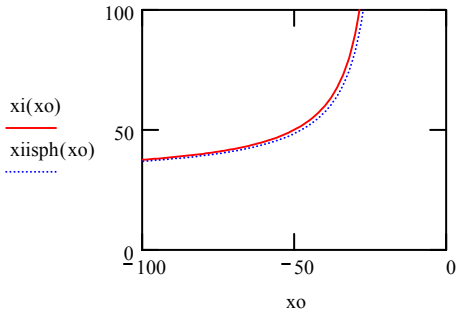
$$xi(xo) := \frac{1}{\frac{n-1}{n \cdot r} + \frac{1}{n \cdot xo}}$$

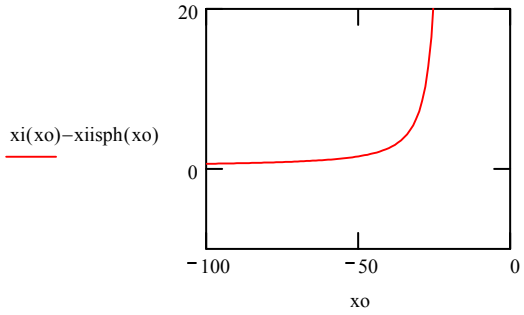
Input Data $ro \equiv 2 \quad n \equiv 1.5 \quad r \equiv 10$

$xo \equiv -20, -21 .. -100$

2. Calculation of xiisph(xo) depending on xo for the corrected case of L.S.A.

$$xiisph(xo) := \frac{n}{\left(\frac{n-1}{r}\right) + \frac{1}{xo} + \frac{n-1}{n^2} \cdot \frac{ro^2}{2} \cdot \left[\left(\frac{1}{r} - \frac{1}{xo}\right)^2 \cdot \left(\frac{1}{r} - \frac{n+1}{xo}\right)\right]}$$



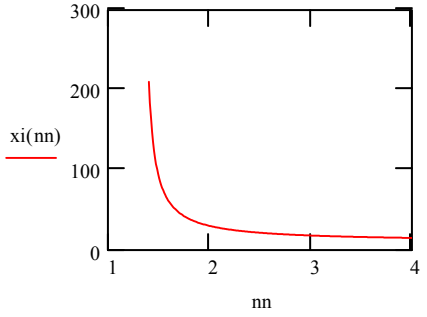


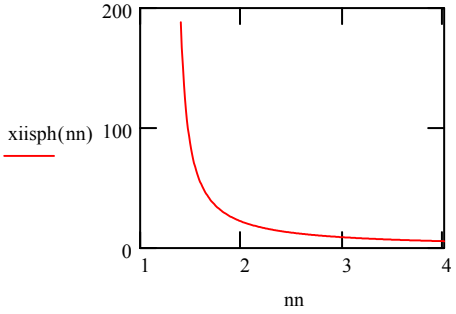
3. Calculation of xiisph(nn) depending on the refractive index nn

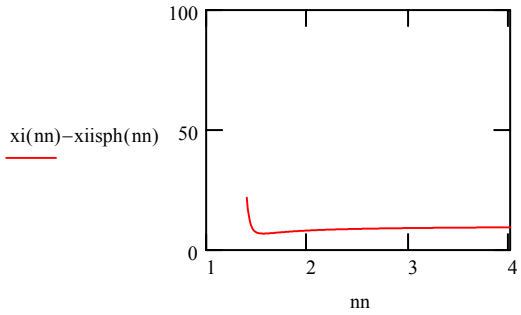
$nn := 1.40, 1.41 .. 4$ $\quad xxo := -30$ $\quad rr := 10$

$$xi(nn) := \frac{1}{\frac{nn-1}{nn \cdot rr} + \frac{1}{nn \cdot xxo}}$$

$$xiisph(nn) := \frac{n}{\left(\frac{nn-1}{rr}\right) + \frac{1}{xxo} + \frac{nn-1}{nn^2} \cdot \frac{ro^2}{2} \cdot \left[\left(\frac{1}{rr} - \frac{1}{xxo}\right)^2 \cdot \left(\frac{1}{rr} - \frac{nn+1}{xxo}\right)\right]}$$







There is no nn value
for which LSA = 0

4. Calculation of xiisph(rrr) depending on the radius of curvature rrrr

$rrr := 1, 2 .. 20$ $\quad nnn \equiv 1.5$ $\quad xxxo \equiv 10$

$$xi(rrr) := \frac{1}{\frac{nnn - 1}{nnn \cdot rrr} + \frac{1}{nnn \cdot xxxo}}$$

$$xiisph(rrr) := \frac{n}{\left(\frac{nnn - 1}{rrr}\right) + \frac{1}{xxxo} + \frac{nnn - 1}{nnn^2} \cdot \frac{ro^2}{2} \cdot \left[\left(\frac{1}{rrr} - \frac{1}{xxxo}\right)^2 \cdot \left(\frac{1}{rrr} - \frac{nnn + 1}{xxxo}\right)\right]}$$