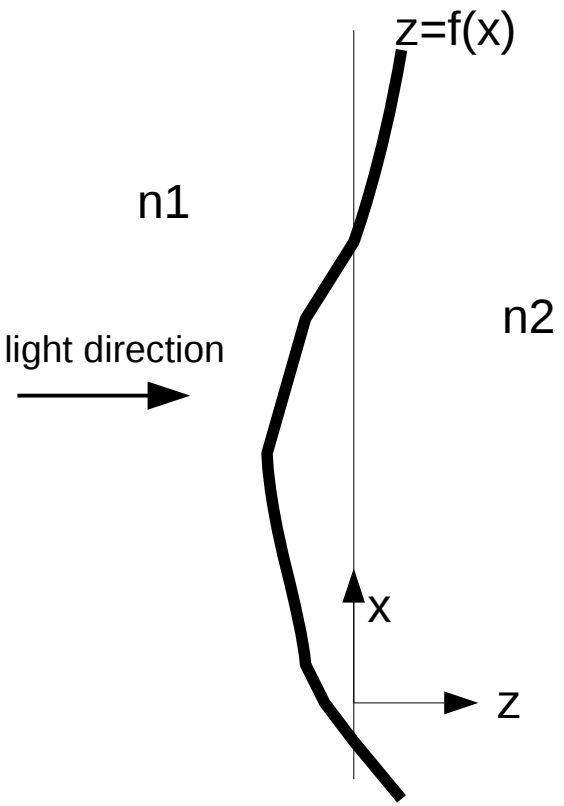
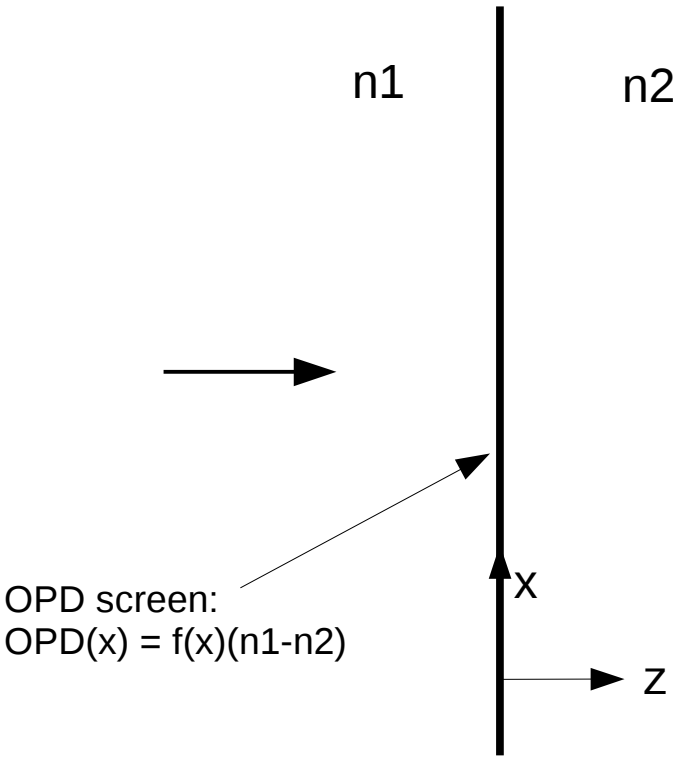
Diffraction propagation: curved surfaces

How to approximate an optical surface as an OPD screen for diffraction propagation ?

Actual physical optical surface



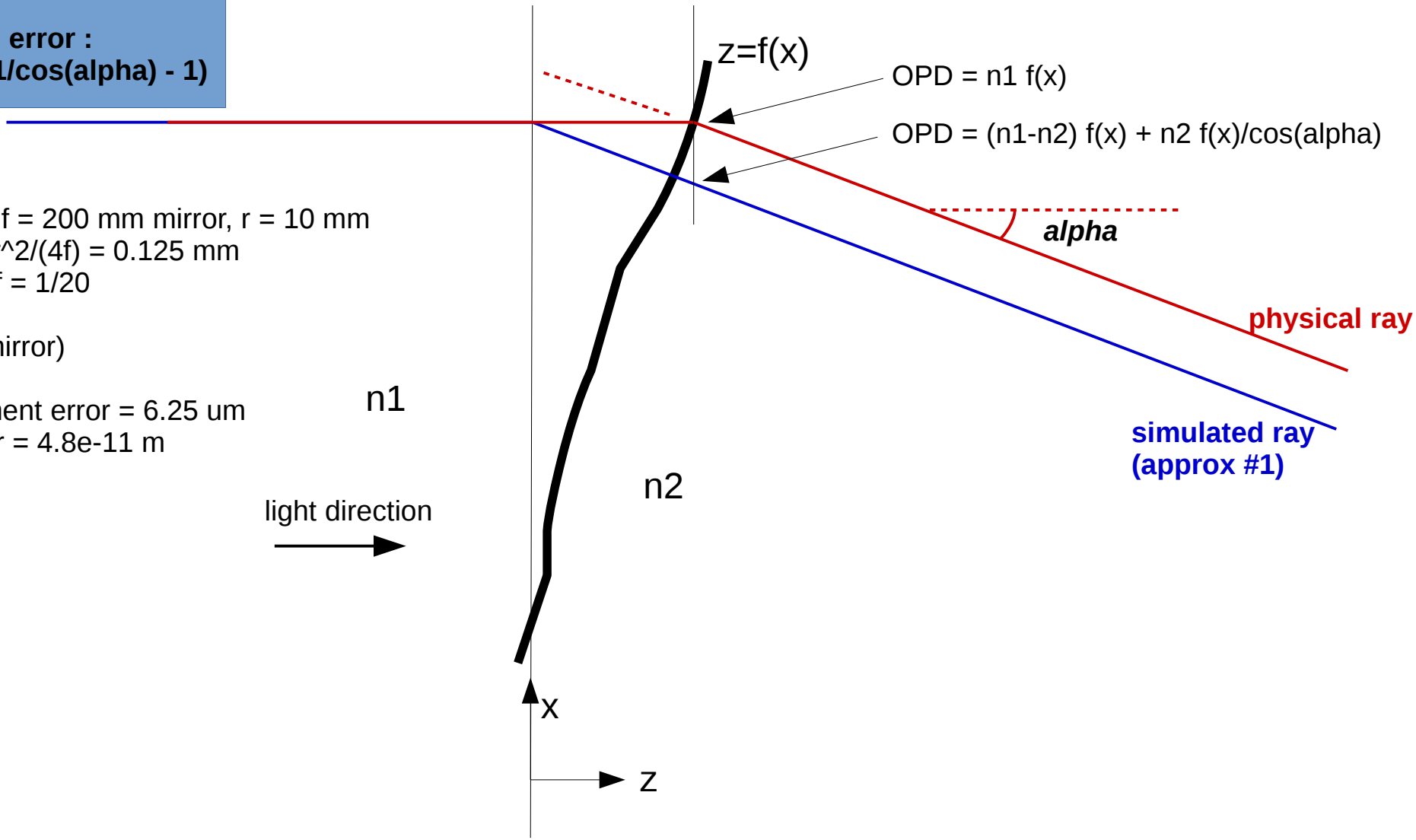
OPD screen Approximation



How much is the OPD screen approximation wrong ?

ray displacement error :
alpha f(x)

ray OPD error :
n2 f(x) (1/cos(alpha) - 1)



Example: f = 200 mm mirror, r = 10 mm
sagitta = r^2/(4f) = 0.125 mm
alpha = r/f = 1/20
n1 = 1
n2 = -1 (mirror)

displacement error = 6.25 um
OPD error = 4.8e-11 m