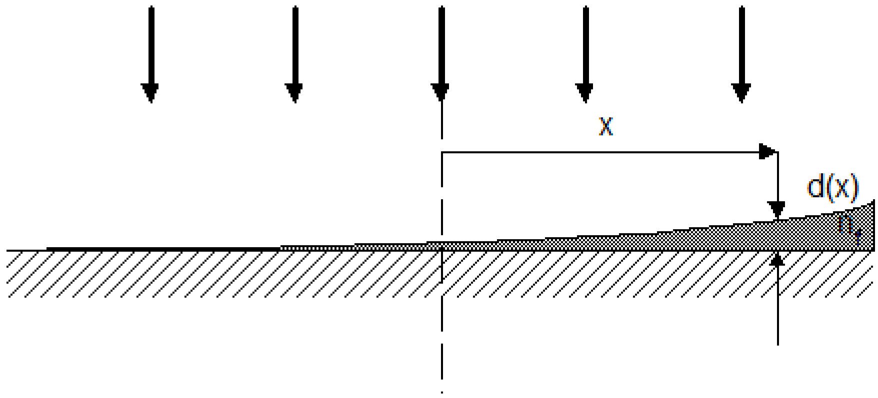
INTERFERENCE

Fringes from a wedge-shaped film

As in the previous example of Newton's rings fringes will appear when the phase difference between the waves reflected from the two surfaces of the wedge is $2.n_f .d(r)=(m+1/2).\lambda$, where m is an integer.



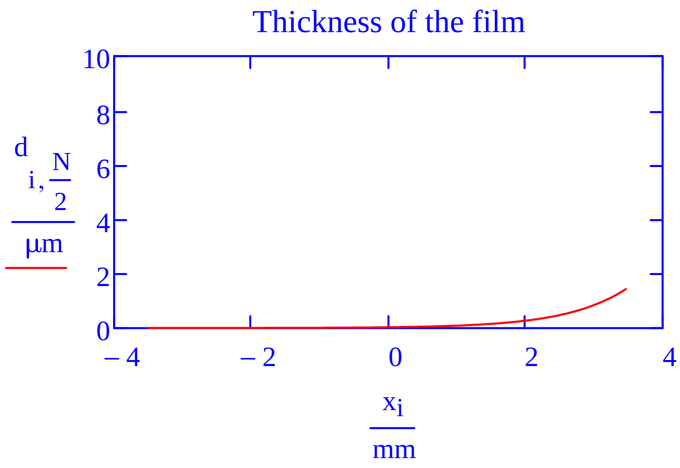
$\mu m \equiv 10^{-6} \cdot m$ $\quad nm \equiv 10^{-9} \cdot m$ $\quad k := \frac{2 \cdot \pi}{\lambda}$

We define a thin wedge film by the arbitrary function below:

$i := 0 .. N-1$ $\quad x_i := \frac{-size}{2} + i \cdot \frac{size}{N}$

$j := 0 .. N-1$

$$d_{i,j} := -d_0 \cdot \left[1 - \exp\left[\left(\frac{x_i + \frac{size}{2}}{\frac{size}{2}} \right)^4 \right] \right]$$



With the extra π because of internal reflection the phase becomes:

$$\Delta\phi := 2 \cdot n_f \cdot d \cdot k + \pi$$

Next we define the field reflected by the first surface:

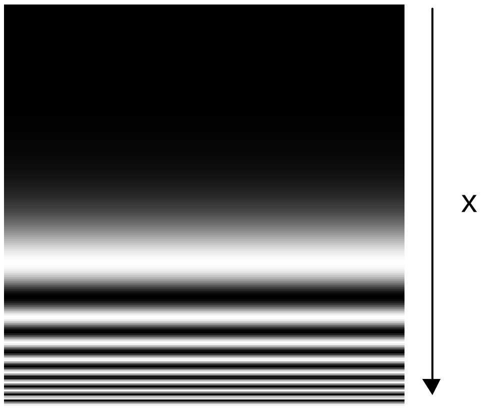
$$F_1 := \text{LPBegin}\left(\frac{size}{m}, \frac{\lambda}{m}, N\right) \qquad F_1 := \text{LPSubPhase}\left(\Delta\phi, F_1\right)$$

And by the second surface:

$$F_2 := \text{LPBegin}\left(\frac{size}{m}, \frac{\lambda}{m}, N\right)$$

Adding the two fields and calculating the intensity gives the interference patte just above the wedge:

$$F := \text{LPBeamMix}\left(F_1, F_2\right) \qquad I := \text{LPIntensity}(2, F)$$



I

Interference pattern by reflection just above the wedge.

$size \equiv 7 \cdot mm$

$\lambda \equiv 500 \cdot nm$

$N \equiv 200$

$n_f \equiv 1.5$

$d_0 \equiv 0.0005 \cdot \mu m$