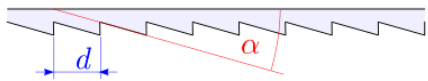
4. Fresnel prism (12 points) — *Eero Uustalu and Jaan Kalda.*

Equipment: a sheet of Fresnel prism, a sheet with purple and magenta stripes (see separate sheet), a piece of cardboard paper (can be used as a screen), ruler, measuring tape, stand, green laser ($\lambda_0 = 532\,\text{nm}$). NB! Avoid looking into direct or reflected laser light, it my damage your eyes! The intensity maximum for the scattered light from magenta stripes is $\lambda_m = 630\,\text{nm}$, and from cyan stripes — $\lambda_c = 495\,\text{nm}$.

Fresnel prism is a transparent sheet with a periodic array of stripes; cross-section of such a sheet is shown in figure. The refraction index of the material from which the sheet is made $n = 1.47$.



i) *(4 points)* Determine the pitch d of the Fresnel prism (see figure for the definition of the pitch).

ii) *(4 points)* Determine the angle α of the prism.

iii) *(4 points)* Assuming that in the range of visible light, the refraction index $n = n(\lambda)$ of the Fresnel prism material is a linear function of wavelength λ, determine the chromatic dispersion $\frac{\mathrm{d}n}{\mathrm{d}\lambda}$.