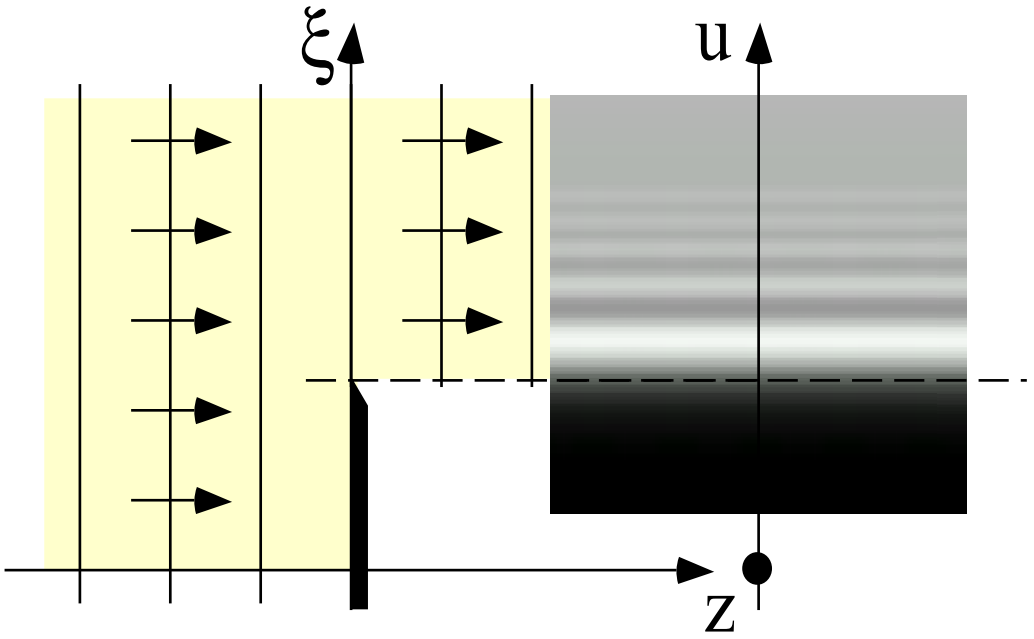
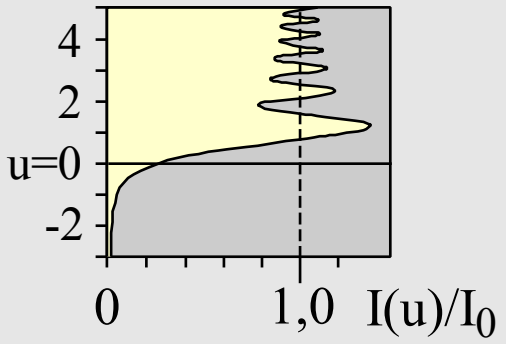
Wave Optics:
Fresnel diffraction from a straight edge



$$\mathcal{E}(u) = \mathcal{E}_0(z) \int_{-\infty}^{u} \exp\left[i\frac{\pi}{2}u'^2\right] du'$$



$$u := \sqrt{\frac{2}{\lambda z}}x$$

$$I(u) := \epsilon_0 c^2 |\mathcal{E}(u)|^2/2$$

The integral is evaluated by means of the **Fresnel integral**:

$$C(u) := \int_0^u \cos\frac{\pi}{2}u'^2 du'$$

$$S(u) := \int_0^u \sin\frac{\pi}{2}u'^2 du'$$

The **Cornu spirale** displays the Fresnel integrals: