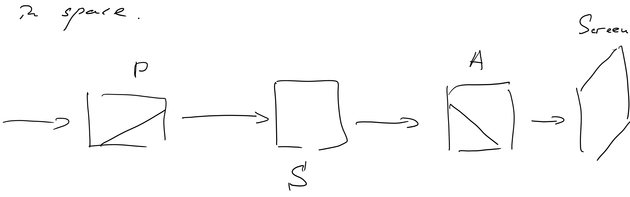
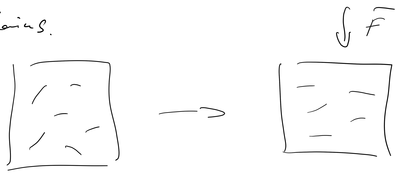
Anisotropy can appear in isotropic media if we introduce mechanical perturbations.

As we discussed, not only anisotropy of single oscillators is important, but its ordering in space.



Demonstration

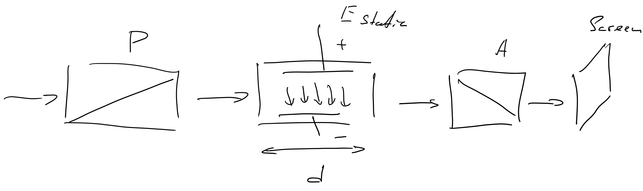
This effect is connected to deformation of electronic distributions within atoms and anisotropic molecules and re-orientation of anisotropic molecules. For polymers it may be re-orientation of chains.



$$\Delta n = n_e - n_o = b\frac{F}{S}$$

Demonstrations

Kerr effect



$$n_e - n_o = k E^2_{static}$$

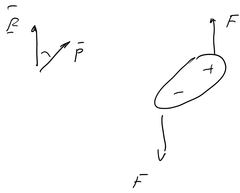
$$\Delta\varphi = \frac{2\pi}{\lambda} d k E^2_{static} = 2\pi B d E^2_{static} \qquad B = \frac{k}{\lambda}$$

Kerr constant

Explanation for Kerr effect was offered by Langevin (1910).

Molecule is actually anisotropic

$$\bar{p} = \varepsilon_0 \hat{\alpha} \bar{E}_{static}$$



Force momentum in this case

$$\bar{M} = \left[\bar{p}\,\bar{E}_{static}\right] \Rightarrow M \sim E^2_{static}$$

If $E_{static} = 15\ kV/cm$

$d = 5\ cm$

Nitrobenzene

This will be the cell, like $\frac{\lambda}{4}$.

Demonstration