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Variation of the Refractive Index with Frequency

António Saraiva -- 2008-03-17
ajps2@hotmail.com

Lorentz's equations:

$$w = c^2 \frac{w_0 + v}{c^2 + v w_0} \quad ; \quad f = f_0 \frac{c\sqrt{c^2 - v^2}}{c^2 + v w_0}$$

$$dw = c^2 \frac{c^2 - v^2}{(c^2 + v w_0)^2} dw_0 \quad ; \quad \frac{c^2 - v^2}{(c^2 + v w_0)^2} = \frac{f^2}{c^2 {f_0}^2}$$

This is an approximation because v is a function of w_0, but for visible light $v \approx -c$ almost constant.

$$dw = \frac{f^2}{{f_0}^2} dw_0 \quad ; \quad f^2 = \frac{c^2 - w^2}{k} \quad ; \quad {f_0}^2 = \frac{c^2 - {w_0}^2}{k}$$

$$\frac{dw}{c^2 - w^2} = \frac{dw_0}{c^2 - {w_0}^2} \quad \Leftrightarrow$$

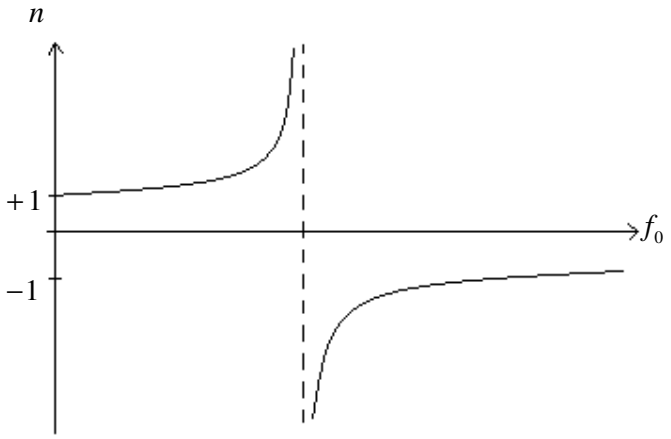
$$\Leftrightarrow \quad \log\left|\frac{c + w}{c - w}\right| = \log\left|\frac{c + w_0}{c - w_0}\right| + \log A$$

$$w = c \frac{A(c + w_0) - (c - w_0)}{A(c + w_0) + (c - w_0)}$$

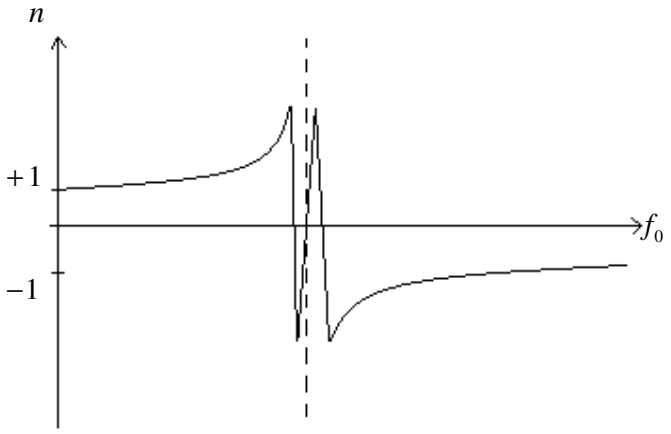
$$w_0 \approx c \quad ; \quad c - w_0 \approx \frac{k {f_0}^2}{2c} \quad ; \quad n = \frac{c}{w}$$

Refractive Index

$$n = \frac{B + f_0^{\,2}}{B - f_0^{\,2}} \quad ; \quad B \text{ is an experimental constant.}$$



Real graphic at slow light experiments



Mathematical infinites don't exist in nature.
We have proved that Lorentz's equations admit different speeds than light speed.