Coefficiente di dispersione : $S \triangleq -\frac{\lambda}{c}\frac{\partial^2 n_e}{\partial \lambda^2}$

Dispersione $\boxed{D = S \cdot L \cdot \Delta\lambda_s}$

$V = a\,k\,NA \qquad NA = n_2\sqrt{2\Delta}$

$\boxed{\Delta = \frac{n_1^2 - n_2^2}{2n_2^2} \;\Big|\; b = \frac{\left(\frac{\beta}{k}\right)^2 - n_1^2}{n_2^2 - n_2^2}}$

Essendo $\boxed{\beta \simeq n_2 k (1 + \Delta \cdot b)}$ $\qquad (\Delta \ll 1)$

è $\quad n_e = \frac{\beta}{k} \simeq n_2(1+\Delta b) = n_2\left(1 + \frac{n_1 - n_2}{n_2} \cdot b\right)$

Ipotesi Δ indipendente da λ (cautela)

$$\frac{\partial^2 n_e}{\partial \lambda^2} = \frac{\partial^2 n_2}{\partial \lambda^2} + \frac{\partial}{\partial \lambda}\left(\frac{\partial}{\partial \lambda} n_2 \Delta \cdot b\right)$$

$$= \frac{\partial^2 n_2}{\partial \lambda^2} + \boxed{\frac{\partial}{\partial \lambda}\left(\frac{\partial}{\partial \lambda}\frac{V b \lambda \sqrt{\Delta}}{2\pi \cdot a \cdot \sqrt{2}}\right)}$$

(essendo $V \simeq a\frac{2\pi}{\lambda} n_2 \cdot \sqrt{2\Delta} \rightarrow \left(n_2\sqrt{\Delta} = \frac{V \cdot \lambda}{2\pi \cdot a \cdot \sqrt{2}}\right)$)

$$\boxed{\frac{\partial}{\partial \lambda}\left(\frac{\partial}{\partial \lambda}\frac{V b \lambda \sqrt{\Delta}}{2\pi a \sqrt{2}}\right)} = \frac{\partial}{\partial \lambda}\left(\frac{Vb\sqrt{\Delta}}{2\pi a \cdot \sqrt{2}} + \frac{\lambda \cdot \sqrt{\Delta}}{2\pi a \cdot \sqrt{2}}\frac{\partial Vb}{\partial V}\frac{\partial V}{\partial \lambda}\right)$$

$$= \frac{\sqrt{\Delta}}{2\pi a \sqrt{2}}\frac{\partial}{\partial V}\left(Vb + \left(-\frac{V}{\lambda}\right)\cdot \lambda \frac{\partial Vb}{\partial V}\right)\cdot\left(-\frac{V}{\lambda}\right)$$

$\left(V = a \cdot k \cdot NA = a \cdot \frac{2\pi}{\lambda} NA\text{;}\right.$ trascurando la dip. di NA da λ è $\left.\frac{\partial V}{\partial \lambda} = -\frac{V}{\lambda}\right)$ $\quad -\frac{1}{\lambda^2}\,2\pi a\, NA$

$$= \frac{\sqrt{\Delta}}{2\pi a \sqrt{2}} \cdot \left(-\frac{V}{\lambda}\right) \cdot \left(-\frac{\partial^2 Vb}{\partial V^2}\right)$$

$$= \frac{n_2 \Delta}{\lambda^2} \cdot V \cdot \frac{\partial^2 Vb}{\partial V^2}$$