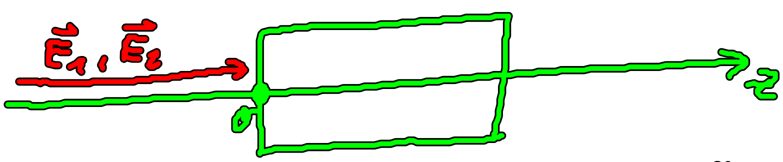
4.3 Bestimmung der zweiten Harmonischen

$$\vec{e}_\perp \cdot \underline{\underline{\varepsilon}} \cdot \vec{E}_3 = (e_1, e_2, 0) \begin{pmatrix} \varepsilon_\perp & 0 & 0\\ 0 & \varepsilon_\perp & 0 \\ 0 & 0 & \varepsilon_\parallel\end{pmatrix}\cdot\begin{pmatrix} e_1 E_\perp\\ e_2 E_\perp\\ E_\parallel\end{pmatrix} \qquad |\vec{e}_\perp| = 1 = e_1^2+e_2^2$$

$$= (e_1, e_2, 0)\begin{pmatrix}\varepsilon_\perp e_1 E_\perp\\ \varepsilon_\perp e_2 E_\perp\\ \varepsilon_\parallel E_\parallel\end{pmatrix} = \varepsilon_\perp (e_1^2+e_2^2) E_\perp + 0 = \varepsilon_\perp E_\perp$$

Dgl.: $$\frac{\partial^2}{\partial z^2} E_\perp + \frac{\omega_3^2}{c^2}\varepsilon_\perp E_\perp = -\frac{\omega_3^2}{c^2}\underbrace{\vec{e}_\perp \cdot \underline{\chi}^{(2)} : \vec{m}_1 \vec{m}_2}_{=\chi_\perp^{(2)}} E_{10} E_{20} \exp\{i(k_1+k_2)z\}$$

$$\left(\frac{\partial^2}{\partial z^2} + k^2\right) E_\perp(z, \omega_3) = -\frac{\omega_3^2}{c^2}\chi_\perp^{(2)} E_{10} E_{20} \exp\{i(k_1+k_2)z\} \qquad \Big| \quad \frac{\omega_3^2}{c^2}\varepsilon_\perp = k^2$$



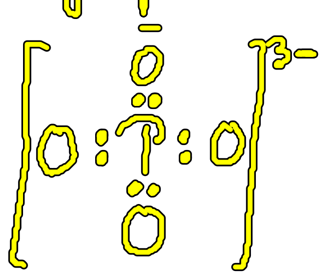
$$e^{i\alpha} - 1 = e^{i\frac{\alpha}{2}}\left(e^{i\frac{\alpha}{2}} - e^{-i\frac{\alpha}{2}}\right) = e^{i\frac{\alpha}{2}}\, 2i \sin\frac{\alpha}{2}$$

$$v\frac{c^2}{v^2}\varepsilon_0 \frac{1}{2}\frac{\omega_3}{4k^2c^4}\omega_3^3 = \cancel{v}\frac{\cancel{c^2}}{\cancel{v^2}}\frac{1}{2}\varepsilon_0 \frac{\cancel{v}k\omega_3^3}{4k^{\cancel{2}}c^{\cancel{4}}} = \frac{\varepsilon_0 \omega_3^3}{8kc^2}$$

Dielektrikum KH_2PO_4

Kaliumdihydrogenphat oder KDP

Phosphation



K^+
H^+
H^+
Kationen

O: 6 Valenzelektronen

P: 5 Valenzelektronen