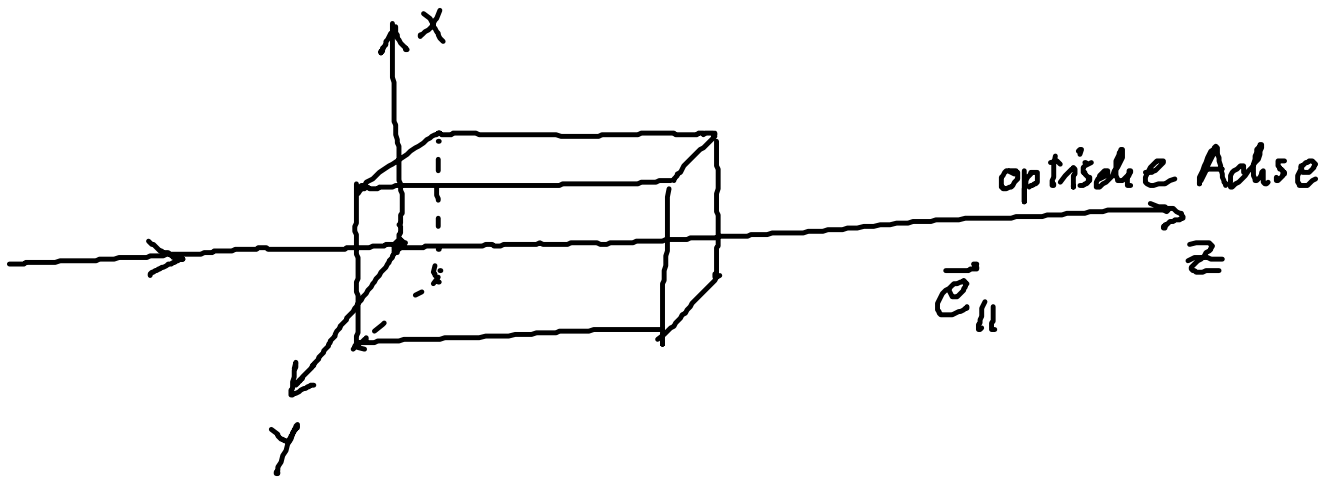


3 Nichtlineare Optik



$$\underline{\epsilon} \cdot \vec{e}_{\parallel} = \begin{pmatrix} \epsilon_{\perp} & 0 & 0 \\ 0 & \epsilon_{\perp} & 0 \\ 0 & 0 & \epsilon_{\parallel} \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ \epsilon_{\parallel} \end{pmatrix} = \epsilon_{\parallel} \vec{e}_{\parallel} = \vec{e}_{\parallel} \cdot \underline{\epsilon}$$

$$\underline{\epsilon} \cdot \vec{e}_{\perp} = \begin{pmatrix} \epsilon_{\perp} & 0 & 0 \\ 0 & \epsilon_{\perp} & 0 \\ 0 & 0 & \epsilon_{\parallel} \end{pmatrix} \begin{pmatrix} e_1 \\ e_2 \\ 0 \end{pmatrix} = \begin{pmatrix} \epsilon_{\perp} e_1 \\ \epsilon_{\perp} e_2 \\ 0 \end{pmatrix} = \epsilon_{\perp} \vec{e}_{\perp} = \vec{e}_{\perp} \cdot \underline{\epsilon}$$

$$\begin{aligned} \exp\{i\alpha\} - 1 &= \exp\left\{i\frac{\alpha}{2}\right\} \left[\exp\left\{i\frac{\alpha}{2}\right\} - \exp\left\{-i\frac{\alpha}{2}\right\} \right] \\ &= 2i \exp\left\{i\frac{\alpha}{2}\right\} \sin\left\{\frac{\alpha}{2}\right\} \end{aligned}$$