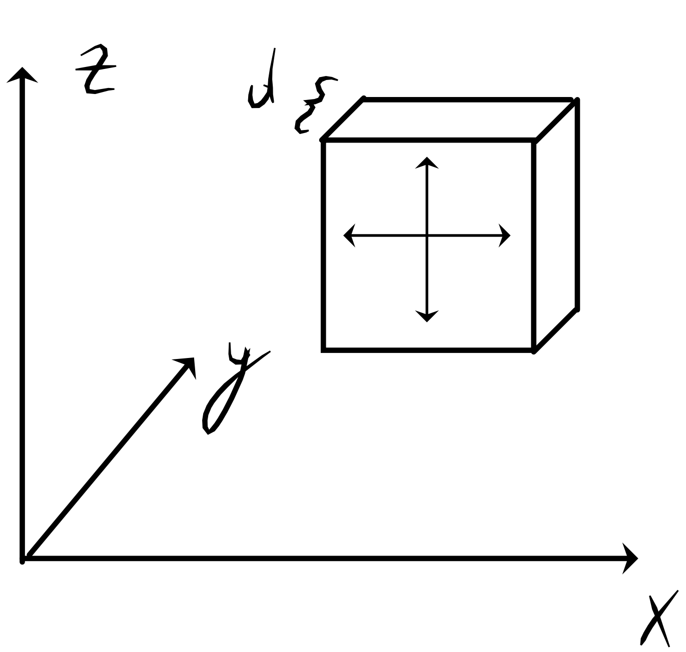

$n_{\parallel} \neq n_{\perp}$ $\quad k_j = \frac{\omega}{c} n_j$ $\quad \bar{k} = \begin{bmatrix} 0 \\ k \\ 0 \end{bmatrix}$ $\quad \bar{v} = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$

$$\bar{E} = E_0 \bar{v} e^{i(ky - \omega t)} = E_0 e^{-i\omega t} \begin{bmatrix} v_1 e^{ik_{\perp} y} \\ v_2 e^{ik_{\parallel} y} \end{bmatrix} = E_0 e^{i(\omega t + \varphi_0)} \begin{bmatrix} v_1 e^{i(k_{\perp} - k_{\parallel}) y} \\ v_2 \end{bmatrix}$$

$$\Rightarrow \quad V_{out} = \begin{bmatrix} v_1 e^{i\Delta\varphi} \\ v_2 \end{bmatrix} = \begin{bmatrix} e^{i\Delta\varphi} & 0 \\ 0 & 1 \end{bmatrix} V_{in} \qquad \Delta\varphi = (k_{\perp} - k_{\parallel}) d$$

$$\omega = \frac{2\pi}{T} = \frac{2\pi}{\lambda \frac{n}{c}} = \frac{2\pi c}{\lambda n} \qquad \Delta\varphi = (k_{\perp} - k_{\parallel}) d = \frac{\omega}{c} (n_{\perp} - n_{\parallel}) d = \frac{2\pi d}{\lambda n} (n_{\perp} - n_{\parallel})$$

gdzie $n = \sqrt{n_{\parallel}^2 + n_{\perp}^2}$ $\qquad d = \frac{\lambda n}{n_{\perp} - n_{\parallel}} \cdot \frac{\Delta\varphi}{2\pi}$ $\qquad V_{in} = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

a) obrót o 45° $\rightarrow$ $V_{out} = \frac{1}{\sqrt{2}} \begin{bmatrix} -1 \\ 1 \end{bmatrix}$ $\quad e^{i\Delta\varphi} = -1$ $\quad \Delta\varphi = \pi$ $\quad d = \frac{\lambda n}{n_{\perp} - n_{\parallel}} \frac{1}{2}$

b) polaryzacja kołowa $V_{out} = \frac{1}{\sqrt{2}} \begin{bmatrix} i \\ 1 \end{bmatrix}$ $\quad e^{i\Delta\varphi} = i$ $\quad \Delta\varphi = \frac{\pi}{2}$ $\quad d = \frac{\lambda n}{n_{\perp} - n_{\parallel}} \frac{1}{4}$