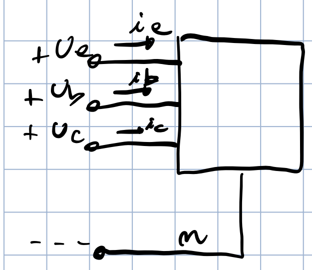
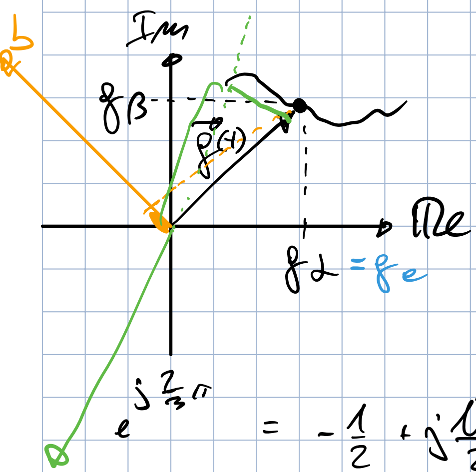
# VETTORI DI SPAZIO




$g_a \quad g_b \quad g_c \qquad g(t)$

$$\bar{g}(t) = \frac{2}{3}\left[ g_a(t) + g_b(t)\, e^{j\frac{2}{3}\pi} + g_c(t)\, e^{j\frac{4}{3}\pi} \right]$$

$$= g_\alpha(t) + j\, g_\beta(t)$$




$$e^{j\frac{2}{3}\pi} = -\frac{1}{2} + j\frac{\sqrt{3}}{2} \qquad e^{j\frac{4}{3}\pi} = -\frac{1}{2} - j\frac{\sqrt{3}}{2}$$

$$Re[\bar{g}] = g_\alpha = \frac{2}{3}\left[g_a - \frac{g_b}{2} - \frac{g_c}{2}\right] = g_a$$

$$Im[\bar{g}] = g_\beta = \frac{2}{3}\left[g_b\frac{\sqrt{3}}{2} - g_c\frac{\sqrt{3}}{2}\right] = \frac{\sqrt{3}}{3}\left[g_b - g_c\right]$$

Se poi $g_a + g_b + g_c = 0 \qquad -g_b - g_c = g_a$

$$g_0 = \frac{g_a + g_b + g_c}{3}$$

Se avessi componente omopolare : $g_a = g_a' + g_0$

$g_b = g_b' + g_0$

$g_c = g_c' + g_0$

$$f_0 = \frac{f_a + f_b + f_c}{3}$$

$$f_\alpha = \frac{2}{3}\left[f_a - \frac{f_b}{2} - \frac{f_c}{2}\right]$$

$$f_\beta = \frac{\sqrt{3}}{3}\left[f_b - f_c\right]$$

$$\begin{bmatrix} f_\alpha \\ f_\beta \\ f_0 \end{bmatrix} = \underbrace{\frac{2}{3}\begin{bmatrix} 1 & -\frac{1}{2} & -\frac{1}{2} \\ 0 & \sqrt{3}/2 & -\frac{\sqrt{3}}{2} \\ \frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{bmatrix}}_{T_{abc \to \alpha\beta 0}} \begin{bmatrix} f_a \\ f_b \\ f_c \end{bmatrix}$$

$$\begin{bmatrix} f_a \\ f_b \\ f_c \end{bmatrix} = \underbrace{\begin{bmatrix} 1 & 0 & 1 \\ -\frac{1}{2} & \sqrt{3}/2 & 1 \\ -\frac{1}{2} & -\frac{\sqrt{3}}{2} & 1 \end{bmatrix}}_{T_{\alpha\beta 0 \to abc}} \begin{bmatrix} f_\alpha \\ f_\beta \\ f_0 \end{bmatrix}$$

$$P = u_a i_a + u_b i_b + u_c i_c = \begin{bmatrix} u_a & u_b & u_c \end{bmatrix} \begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix}$$

$$= \left[u_{abc}\right]^T \left[i_{abc}\right]$$

$$= \left\{\left[T_{\alpha\beta 0 \to abc}\right]\left[u_{\alpha\beta 0}\right]\right\}^T \left[T_{\alpha\beta 0 \to abc}\right]\left[i_{\alpha\beta 0}\right]$$

$$= \left[u_{\alpha\beta 0}\right]^T \left[T_{\alpha\beta 0 \to abc}\right]^T \left[T_{\alpha\beta 0 \to abc}\right]\left[i_{\alpha\beta 0}\right]$$

$$= \frac{3}{2}\left[u_\alpha i_\alpha + u_\beta i_\beta\right] + 3 u_0 i_0$$

$$u_0 = i_0 = 0$$

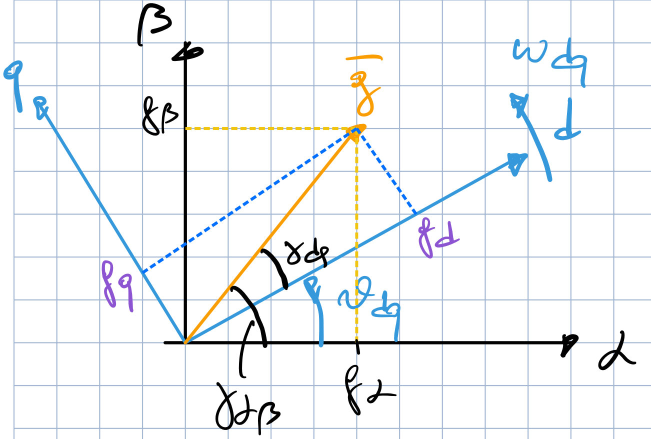
$$\bar{u} = u_\alpha + j u_\beta$$

$$\bar{i} = i_\alpha + j i_\beta$$

$$\bar{u}\,\bar{i}^* = (u_\alpha + j u_\beta)(i_\alpha - j i_\beta)$$

$$= \underbrace{\left[u_\alpha i_\alpha + u_\beta i_\beta\right]}_{p(t)} + j\left[u_\beta i_\alpha - u_\alpha i_\beta\right]$$

$$p(t) = \mathrm{Re}\left[\bar{u}\,\bar{i}^*\right]$$




$$\vartheta_{dq} = \int_0^t \omega_{dq}(t)\,dt$$

$$\bar{g}_{\alpha\beta} = g_\alpha + j\, g_\beta = |\bar{g}|\, e^{j\gamma_{\alpha\beta}}$$

$$\gamma_{\alpha\beta} = \gamma_{dq} + \vartheta_{dq}$$

$$\bar{g}_{dq} = g_d + j\, g_q = |\bar{g}|\, e^{j\gamma_{dq}}$$

$$\bar{g}_{\alpha\beta} = |\bar{g}|\, e^{j\gamma_{\alpha\beta}} = |\bar{g}|\, e^{j[\gamma_{dq}+\vartheta_{dq}]} = |\bar{g}|\, e^{j\gamma_{dq}}\, e^{j\vartheta_{dq}} \overset{!}{=} \bar{g}_{dq}\, e^{j\vartheta_{dq}}$$

$$\bar{g}_{dq} = \bar{g}_{\alpha\beta}\, e^{-j\vartheta_{dq}}$$

$$\begin{bmatrix} g_d \\ g_q \end{bmatrix} = \begin{bmatrix} \cos\vartheta_{dq} & \operatorname{sen}\vartheta_{dq} \\ -\operatorname{sen}\vartheta_{dq} & \cos\vartheta_{dq} \end{bmatrix} \begin{bmatrix} g_\alpha \\ g_\beta \end{bmatrix} = \begin{bmatrix} T_{\alpha\beta\to dq} \end{bmatrix} \begin{bmatrix} g_\alpha \\ g_\beta \end{bmatrix}$$

$$T_{dq\to\alpha\beta} = \begin{bmatrix} \cos\vartheta_{dq} & -\operatorname{sen}\vartheta_{dq} \\ \operatorname{sen}\vartheta_{dq} & \cos\vartheta_{dq} \end{bmatrix}$$

$T_{abc\to dq}$ $\qquad$ $T_{dq\to abc}$