

Frekvencija f [Hz] $f = \frac{1}{T} \text{ [Hz]} = \left[\frac{1}{s} \right]$

Kružna frekvencija ω $\omega = 2 \cdot \pi \cdot f = \frac{2 \cdot \pi}{T}$

Efektivna vrijednost U $U = \frac{U_m}{\sqrt{2}} = 0,707U_m$

Trenutna vrijednost u $u_i(t) = U_{i\max} \cdot \sin(\omega t + \varphi)$

$i(t) = I_{\max} \cdot \sin(\alpha)$
 $i(t) = I_{\max} \cdot \sin(\omega t)$
 $i(t) = I_{\max} \cdot \sin(2\pi f t)$
 $i(t) = I_{\max} \cdot \sin(\omega t \pm \varphi)$

Trenutna vrijednost i $I = I_{ef} = \frac{I_{\max}}{\sqrt{2}}$

Djelatni (aktivni) otpor u izmjeničnom strujnom krugu $i(t) = \frac{u(t)}{R} = \frac{U_m}{R} \cdot \sin \omega t = I_m \cdot \sin \omega t$

$R = \frac{u}{i} = \frac{U}{I} = \frac{U_m}{I_m}$

Induktivni otpor u izmjeničnom strujnom krugu $i(t) = \frac{u(t)}{X_L} = \frac{U_m}{X_L} \cdot \sin \omega t = I_m \cdot \sin \omega t$

$X_L = \omega L = \frac{u}{i} = \frac{U}{I} = \frac{U_m}{I_m}$

$X_L = \omega \cdot L = 2 \cdot \pi \cdot f \cdot L \left[\text{Hz} \cdot \text{H} = \frac{\text{V}}{\text{A}} = \Omega \right]$

Kapacitivni otpor u izmjeničnom strujnom krugu $i(t) = \frac{u(t)}{X_C} = \frac{U_m}{X_C} \cdot \sin \omega t = I_m \cdot \sin \omega t$

$X_C = \frac{1}{\omega \cdot C} = \frac{1}{2 \cdot \pi \cdot f \cdot C} \left[\frac{1}{\text{Hz} \cdot \text{F}} = \frac{\text{V}}{\text{A}} = \Omega \right]$

Serijski RL spoj $U_R = I \cdot R = U \cdot \cos \varphi$ $U_L = I \cdot \omega L = I \cdot X_L = U \cdot \sin \varphi$

$U = \sqrt{U_R^2 + U_L^2}$

$Z = \sqrt{R^2 + X_L^2}$

$I = \frac{U}{Z}$

$\cos \varphi = \frac{U_R}{U} = \frac{R}{Z}$

$\varphi = \arctg \frac{U_L}{U_R}$

Serijski RC spoj

$$U_R = I \cdot R$$

$$U_C = I \cdot \frac{1}{\omega C} = I \cdot X_C$$

$$U = \sqrt{U_R^2 + U_C^2}$$

$$Z = \sqrt{R^2 + X_C^2}$$

$$I = \frac{U}{Z}$$

$$\cos \varphi = \frac{U_R}{U} = \frac{R}{Z}$$

$$\varphi = \arctg \frac{U_C}{U_R}$$

Serijski RLC spoj

$$U = \sqrt{U_R^2 + U_X^2} = \sqrt{U_R^2 + (U_L - U_C)^2}$$

$$Z = \sqrt{R^2 + X^2} = \sqrt{R^2 + (X_L - X_C)^2}$$

$$\cos \varphi = \frac{U_R}{U} = \frac{R}{Z}$$

$$\varphi = \arctg \frac{U_L - U_C}{U_R}$$

Pojava rezonancije

$$X_L = X_C$$

$$U_L = U_C \quad U = U_R$$

$$X_L = X_C \quad Z = R$$

$$\cos \varphi = 1 \quad S = P$$

Rezonantna frekvencija

$$f = \frac{1}{2\pi\sqrt{LC}} = f_0 = f_r$$

$$R = \frac{U}{I_R}$$

$$X_L = \frac{U}{I_L}$$

$$G = \frac{1}{R} = \frac{I_R}{U}$$

$$B_L = \frac{1}{X_L} = \frac{I_L}{U}$$

Paralelni RL spoj

$$I_R = \frac{U}{R}$$

$$I_L = \frac{U}{\omega L} = \frac{U}{X_L}$$

$$\begin{aligned} \vec{I} &= \vec{I}_R + \vec{I}_L \\ I^2 &= I_R^2 + I_L^2 \\ I &= \sqrt{I_R^2 + I_L^2} \end{aligned}$$

$$Y = \sqrt{G^2 + B_L^2}$$

$$U = \frac{I}{Y} = I \cdot Z$$

$$\cos \varphi_Y = \frac{I_R}{I} = \frac{G}{Y} = \frac{Z}{R}$$

$$\varphi_Y = \arctg \frac{I_L}{I_R}$$

Paralelni RC spoj

$$I_R = \frac{U}{R}$$

$$I_C = \frac{U}{\frac{1}{\omega C}} = \frac{U}{X_C}$$

$$\begin{aligned} R &= \frac{U}{I_R} \\ G &= \frac{1}{R} = \frac{I_R}{U} \end{aligned}$$

$$\begin{aligned} X_C &= \frac{U}{I_C} \\ B_C &= \frac{1}{X_C} = \frac{I_C}{U} \end{aligned}$$

$$\vec{I} = \vec{I}_R + \vec{I}_C$$

$$I^2 = I_R^2 + I_C^2$$

$$I = \sqrt{I_R^2 + I_C^2}$$

$$Y = \sqrt{G^2 + B_C^2}$$

$$U = \frac{I}{Y} = I \cdot Z$$

$$\cos \varphi_Y = \frac{I_R}{I} = \frac{G}{Y} = \frac{Z}{R}$$

$$\varphi_Y = \arctg \frac{I_C}{I_R}$$

Paralelni RLC spoj

$$I_R = \frac{U}{R}$$

$$I_C = \frac{U}{\frac{1}{\omega C}} = \frac{U}{X_C}$$

$$I_L = \frac{U}{\omega L} = \frac{U}{X_L}$$

$$\vec{I} = \vec{I}_R + \vec{I}_C + \vec{I}_L$$

$$I^2 = I_R^2 + (I_C - I_L)^2$$

$$I = \sqrt{I_R^2 + (I_C - I_L)^2}$$

$$I = \sqrt{I_R^2 + I_X^2}$$

$$I_X = I_C - I_L$$

$$B_X = B_C - B_L$$

$$U = \frac{I}{Y} = I \cdot Z$$

$$\cos \varphi_Y = \frac{I_R}{I} = \frac{G}{Y} = \frac{Z}{R}$$

$$\varphi_Y = \arctg \frac{I_X}{I_R}$$

$$Y = \sqrt{G^2 + (B_C - B_L)^2} = \sqrt{G^2 + B_X^2}$$

Posebni slučaj, događa se kada se ispuni **uvjet rezonancije**

$$B_L = B_C \quad \vec{I}_L = \vec{I}_C$$

$$I_X = 0 \quad I = I_R$$

$$B_L = B_C \quad Y = G$$

$$B_X = 0 \quad \varphi_Y = \varphi = 0$$

$$\cos \varphi = \cos \varphi_Y = 1 \quad S = P \quad Q_{uk} = 0$$