

### PARALELNI SPOJ "R" I "L"

I Kirchhoffov zakon:

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

$$I^2 = I_R^2 + I_L^2$$

$$\cos \varphi = \frac{I_R}{I}$$

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G... radna (omska) vodljivost (S- siemens)  
 B<sub>L</sub>.. Jalova (induktivna) vodljivost (S)  
 Y... Ukupna vodljivost (admitancija)

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

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

$$Y = \frac{1}{Z}$$

$$Y^2 = G^2 + B_L^2$$

$$\cos \varphi = \frac{G}{Y}$$

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### PARALELNI SPOJ "R" I "C"

I Kirchhoffov zakon:

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

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

$$\cos \varphi = \frac{I_R}{I}$$

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B<sub>C</sub>.. Jalova (kapacitivna) vodljivost (S)

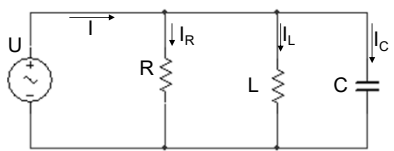
$$B_C = \frac{1}{X_C}$$

$$Y^2 = G^2 + B_C^2$$

$$\cos \varphi = \frac{G}{Y}$$

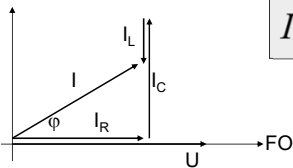
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### PARALELNO "R", "L" I "C"



I Kirchhoffov zakon:  

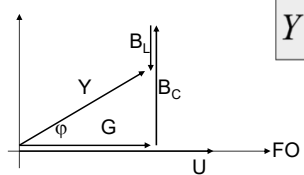
$$\vec{I} = \vec{I}_R + \vec{I}_L + \vec{I}_C$$



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

$$\cos \varphi = \frac{I_R}{I}$$

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$$Y^2 = G^2 + (B_C - B_L)^2$$

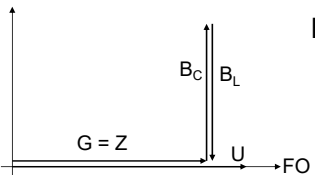
$$\cos \varphi = \frac{I_R}{I}$$

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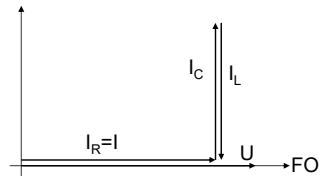
### PARALELNA REZONANCIJA

- I kod ove, paralelne rezonancije, također trebaju biti zadovoljeni uvjeti:  
 Jalove vodljivosti su jednake  $B_L = B_C$  iz toga slijedi da su struje koje teku kroz jalove otpore također jednake  $I_L = I_C$  (poništavaju se).

Rezonantna frekvencija:

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


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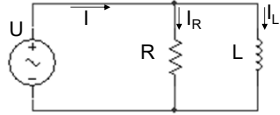


Ukupna struja spoja je u stvari i struja koja teče na djelatnim otporom R, jer se jalove struje  $I_L$  i  $I_C$  svojim smjerovima djelovanja poništavaju.

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Primjer 1 : Paralelno su spojeni zavojnica i otpor u krug izmjenične struje na napon  $U=10V$ ,  $f=60Hz$ . Induktivitet zavojnice je  $10\text{ mH}$ , a otpor je  $5\Omega$ . Kolika je struja,  $X_L$ , te ukupan otpor  $Z$ ? Kolike su struje koje teku pojedinim otporima, te  $\cos\varphi$ ?

$U = 10\text{ V}$   
 $f = 60\text{ Hz}$   
 $L = 10\text{ mH}$   
 $R = 5\ \Omega$



$X_L, I, I_L, I_R, Z, \cos\varphi?$

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$$X_L = 2\pi fL = 3,768[\Omega]$$

$$G = \frac{1}{R} = 0,2[S]$$

$$B_L = \frac{1}{X_L} = 0,265[S]$$

$$Y = \sqrt{G^2 + B_L^2} = 0,3323[S]$$

$$I = \frac{U}{Z} = U \times Y = 3,32[A]$$

$$I_R = \frac{U}{R} = 2[A]$$

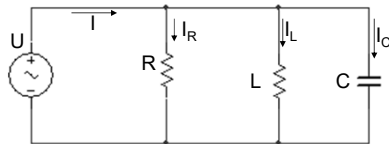
$$I_C = \frac{U}{X_C} = 2,65[A]$$

$$\cos\varphi = \frac{I_R}{I} = 0,6$$

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Primjer 2: Paralelno su spojeni  $R=250\Omega$ ,  $L=650\text{ mH}$  i  $C=1,5\ \mu F$ . Frekvencija je  $60\text{ Hz}$ , napona  $120\text{ V}$ . Izračunati struju, struju kroz djelatni otpor, zavojnicu i kondenzator te ukupnu impedanciju, induktivni i kapacitivni otpor.

$R = 250\ \Omega$   
 $L = 650\text{ mH}$   
 $C = 1,5\ \mu F$   
 $f = 60\text{ Hz}$   
 $U = 120\text{ V}$



$I, I_R, I_L, I_C, Z, X_L, X_C=?$

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$$X_L = 2\pi fL = 245[\Omega] \quad Y = \sqrt{G^2 + (B_L - B_C)^2} = 5,325 \times 10^{-3}[S]$$

$$X_C = \frac{1}{2\pi fC} = 1768[\Omega] \quad Z = \frac{1}{Y} = 187,8[\Omega]$$

$$G = \frac{1}{R} = 4 \times 10^{-3}[S]$$

$$I = \frac{U}{Z} = 0,64\text{ A}$$

$$B_L = \frac{1}{X_L} = 4,08 \times 10^{-3}[S]$$

$$I_R = \frac{U}{R} = 0,48\text{ A}$$

$$B_C = \frac{1}{X_C} = 5,65 \times 10^{-4}[S]$$

$$I_C = \frac{U}{X_C} = 0,068\text{ A}$$

$$I_L = \frac{U}{X_L} = 0,49\text{ A}$$

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