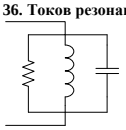
36. Токов резонанс в GLC двуполюсник



$Y = G - j(\frac{1}{\omega L} - \omega C) = G - jB$;

$y = \sqrt{G^2 + (\frac{1}{\omega L} - \omega C)^2}$;Im[Y_p]=B_p=0;

$B = \frac{1}{\omega L} - \omega C$; $B_p = \frac{1}{\omega_p L} - \omega_p C$;

$\omega_p = \frac{1}{\sqrt{LC}}$; Y_p=y_p=G->мининмум

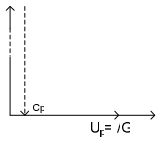
$\gamma = \sqrt{\frac{C}{L}}; [\gamma] = s$;

$B_{Lp} = \frac{1}{\omega_p L} = \frac{\sqrt{LC}}{L} = \sqrt{\frac{C}{L}} = \gamma$;

$B_{Cp} = \omega_p C = \frac{C}{\sqrt{LC}} = \sqrt{\frac{C}{L}} = \gamma$ =>B_L=B_{Cp}=γ; I=yU; U=I/y; -> $U_p = \frac{I}{G}$ ->мах. $I_{Lp} = B_{Lp} U_p = \gamma \frac{I}{G} = \frac{\gamma}{G} I$;

$I_{Cp} = B_{Cp} U_p = \gamma \frac{I}{G} = \frac{\gamma}{G} I$

$Q = \frac{\gamma}{G}$ - качествен фактор



$U = u_m \sin(\omega t + \varphi_u)$;

$i_L = \frac{1}{L}\int u dt = -\frac{1}{\omega L} u_m \cos(\omega t + \varphi_u)$

Енергия:

$W = W_C + W_L = \frac{1}{2} C U^2 + \frac{1}{2} L i^2 =$

$\frac{1}{2} C U_m^2 \sin(\omega t + \varphi_u) + \frac{1}{2} L \frac{U_m^2}{\omega^2 L^2} \cos^2(\omega t + \varphi_u)$

;

$\omega_p = \frac{1}{\sqrt{LC}}$

$W_p = \frac{1}{2} C U_m^2 \sin(\omega t + \varphi_u) +$ ->

$\frac{1}{2} L \frac{U_m^2}{\frac{1}{LC} L^2} \cos^2(\omega t + \varphi_u)$

$W_p = \frac{1}{2} C U_m^2 (\sin(\omega t + \varphi_u)$ =const

$+ \cos^2(\omega t + \varphi_u)) = \frac{1}{2} C U_m^2$

Честотни зависимости:

$B_L(\omega) = \frac{1}{\omega L}; B_C(\omega) = \omega C$;

$B(\omega) = \frac{1}{\omega L} - \omega C$;

$y(\omega) = \sqrt{G^2 + (\frac{1}{\omega L} - \omega C)^2}$;

$\varphi(\omega) = arctg \frac{\frac{1}{\omega L} - \omega C}{G}$