Reja.

1. Quyi chastotali filtrlarni hisoblash

2. Yuqori chastotali filtrlarni hisoblash

1. Quyi chastotali filtrlarni hisoblash

П-simon almashtirish sxemasi bo`yicha yig`ilg`an quyi chastotali filtr f=0-1 kGts diapozondagi tiniqlik zonasiga ega L=0.1 Gn bo`lsa quyidagilar aniqlansin.1)filtrning parallel tarmoqlaridagi sig`im. 2)$f_1$=1.2 kGts chastotadagi so`nish koeffisienti.3)f=0.2; 0.6; 1.2 kGts chastotalardagi xarakteristik qarshilik.

1) Paralel tarmoqning sig`imini quyidagilardan aniqlaymiz.

$$\omega_0 = \frac{2}{\sqrt{LC}} \qquad \text{dan} \qquad C' = \frac{C}{2} = \frac{4}{2L\,\omega_0^2} = \frac{2}{0,05\,[2\pi\cdot 1000]^2} = \frac{2\cdot 10^{-8}}{0,05\cdot 39,5} \approx 10^{-6}\ \Phi$$

2) f_1=1.2 kGts chastotadagi to`rtqutblikning doimiysi.

$$A = 1 - \frac{\omega_1^2 LC}{2} = 1 - \frac{57\cdot 10^6\cdot 0,05\cdot 2\cdot 10^6}{2} = -1,85$$

$\omega \geqslant \omega_0$ chastotada $\beta = \pi - \text{const}$ bo`lgani uchun $\alpha = \frac{A}{\cos\beta}$

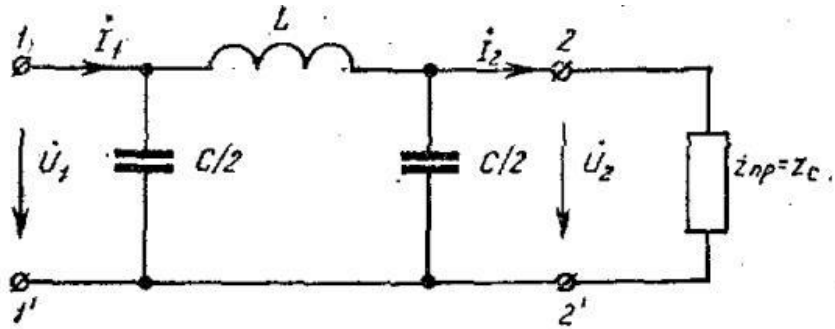bo`lishiga asoslanib, $f_1$=1.2 kGts chastotadagi so`nish koeffisientini topamiz.

$$\alpha = 1,225$$

3) Filtrning xarakteristik qarshiligi quyidagicha topiladi.

$$Z_{cn} = \sqrt{\frac{L}{C}}\cdot\frac{1}{\sqrt{1-\frac{\omega^2}{\omega_0^2}}} = \frac{158}{\sqrt{1-\frac{\omega^2}{\omega_0^2}}} = \frac{158}{\sqrt{1-\left(\frac{f}{f_0}\right)^2}}$$

f=0.2; 0.6; 1.2 kGts chastotalardagi xarakteristik qarshiliklar

$$Z_{cn_1} = \frac{158}{\sqrt{1-0.2^2}} = \frac{158}{0,98} = 161\ \text{Ом}, \quad Z_{cn_2} = \frac{158}{\sqrt{1-0,6^2}} = \frac{158}{0,8} = 198\ \text{Ом},$$

$$Z_{cn_3} = \frac{158}{\sqrt{1-1,2}} = \frac{158}{j\,0,663} = -j\,238\ \text{Ом}.$$

2. Yuqori chastotali filtrlarni hisoblash

T-simon yuqori chastotali filtrning parametrlari C=1 mk F va L=0.01 Gn.Quyidagilar aniqlansin.1)filtrning tiniqlik zonasini hosil qiluvchi chastotalar diapozoni. 2) $w = 0.8 \ w_0$ chastotadagi so`nish koeffisienti. 3) faza koeffisienti va filtrning $w = 2 \ w_0$ chastotadagi xarakteristik qarshiligi.
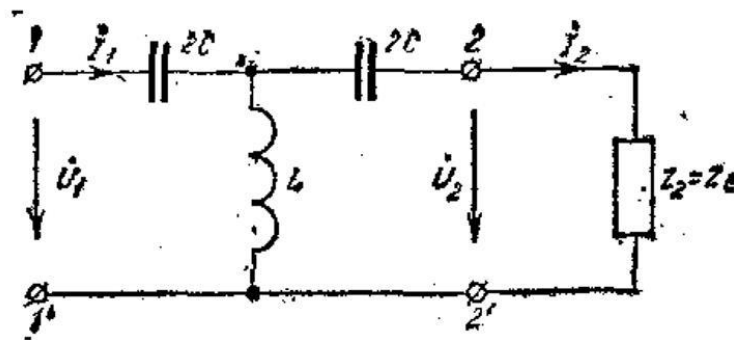
1)Filtrning o`tkazish chastotasi

$$\omega_0 = \frac{1}{2\sqrt{LC}} = \frac{1}{2\sqrt{10^{-6} \cdot 10^{-2}}} = \frac{10^4}{2} = 5 \cdot 10^3 \ \text{рад/сек}$$

$$f_0 = \frac{\omega_0}{2\pi} = 797 \ \text{Гц} \approx 800 \ \text{Гц}$$

$5 \ w_0^3 - \infty$ Demak filtrning tiniqlik zonasi diapozonda bo`ladi.

.2) $w = 0.8 \ w_0$ chastotadagi so`nish koeffisienti.Dastlab filtrning shu chastotadagi parametric A ni to`rtqutblikka o`xshash aniqlaymiz

$$A = 1 - \frac{2\omega_0^2}{\omega^3} \approx 1 - \frac{2}{0.64} = 1 - 3,13 = --2,13$$

chastotada faza koeffisienti $\quad 0 \leqslant \omega \leqslant \omega_0 \quad$ bo`lganligidan

$$\operatorname{ch}\alpha = \frac{A}{\cos\beta} = \frac{-2,13}{-1} = 2,13, \qquad \alpha = 1,39$$

3) $w = 2\,w_0$ chastotadagi faza koeffisienti

$$\cos\beta = 1 - 2\cdot\frac{1}{2^2} = 0,5 \qquad\qquad \beta = \frac{\pi}{3} \;\; \text{рад.}$$

$w = 2\,w_0$ chastotadagi xarakteristik qarshilik

$$Z_{\text{ст}} = \sqrt{\frac{B}{C}} = \sqrt{\frac{Z_1 + Z_2 + Z_1 \cdot Z_2 Y_0}{Y_0}} = \sqrt{\frac{L}{C} - \frac{1}{4\omega^2 C^2}} = \sqrt{\frac{3L}{4C}} =$$

$$= \sqrt{\frac{3\cdot 10^{-2}}{4\cdot 10^{-6}}} = 0,866\cdot 10^2 = 86,6 \;\text{Ом}$$

Sinov savollari.

1. Chastota ajratuvchi filtrlar deb nimaga aytiladi?
2. Quyi chatota filtrlarining ishlash prinsipini tushintiring?