

Obvodové veličiny

Střední hodnota

$$U_0 = \frac{1}{T} \int_0^T u(t) dt$$

Střední hodnota za půl periody

$$U_s = \frac{2}{T} \int_{t_1}^{t_2} u(t) dt$$

Efektivní hodnota

$$U_{ef} = \sqrt{\frac{1}{T} \int_0^T u^2(t) dt}$$

Aritmetická střední hodnota

$$U_{sa} = \frac{1}{T} \int_0^T |u(t)| dt$$

Čísel svazu

$$k_t = \frac{U}{U_s}$$

Čísel výkyvu

$$k_v = \frac{U_m}{U}$$

Čísel plnění

$$k_p = \frac{U_s}{U_m}$$

Prvky el. obvodů

Lineární rezistor

$$i = G \cdot u \quad u = R \cdot i$$

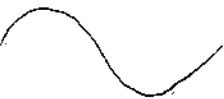
Lineární kapacitor

$$i = C \frac{du}{dt} \quad u = \frac{1}{C} \int_0^t i(\tau) d\tau + u_c(0)$$

Lineární induktor

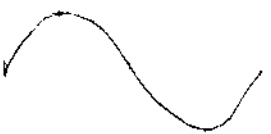
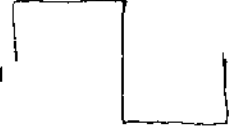
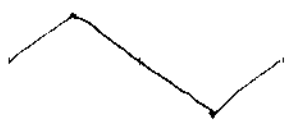
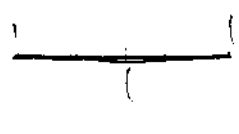
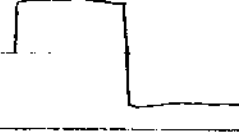
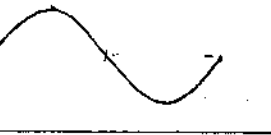
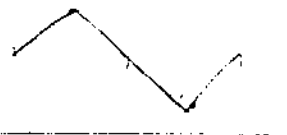
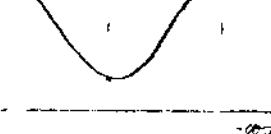
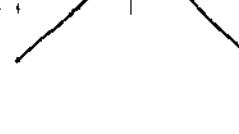
$$i = \frac{1}{L} \int_0^t u(\tau) d\tau + i_L(0) \quad u = L \frac{di}{dt}$$

Obvodové veličiny

			
U_m	4	4	4
$U_{(ef)}$	4	3,07	2,37
U_{as}	4	2,77	2,06
číselný údaj	4,434	3,08	2,28
k_t'	1	1,108	1,150
	100%	99,8%	99,6%
k_v'	1	1,303	1,688
	100%	92,1%	93,5%
k_p'	1	0,693	0,515
	100%	108,9%	103%
$k_t = \frac{U_{(ef)}}{U_{as}}$	1	1,11	1,155
$k_v = \frac{U_m}{U_{(ef)}}$	1	1,414	1,732
$k_p = \frac{U_{as}}{U_m}$	1	0,6366	0,5

z naměřených h.
+ porovnání s tabul.
teoretické h.

Prvky el. obvodů

sdružení "U"			
R			
L			
C			
sdružení "I"			
R			
L			
C			

M. J. J.

návod na úlohy na webu

Měření na rezonančním obvodu

JP1
4. rezonanční kmitočet $f_r = 12,4 \text{ kHz}$

$$U_1 = 0,3 \text{ V} \quad U_2 = 8,1 \text{ V}$$

$$\omega_r L = \frac{1}{\omega_r C}$$

f / kHz	8	11,7	12,4	13,5	16,1
JP1 U_2 / V	0,5	2	8,1	2	0,5
JP2 U_2 / V JP2	0,48	0,6	0,6	0,55	0,35
JP3	0,29	0,24	0,23	0,21	0,17

$$\omega_r L = \frac{1}{\omega_r C}$$

$$\omega_r = 2\pi f_r = 77911 \text{ rad/s}$$

$$L = \frac{1}{\omega_r^2 C} = \frac{1}{77911^2 \cdot 4,7 \cdot 10^{-9}} = \underline{\underline{0,035 \text{ H}}}$$

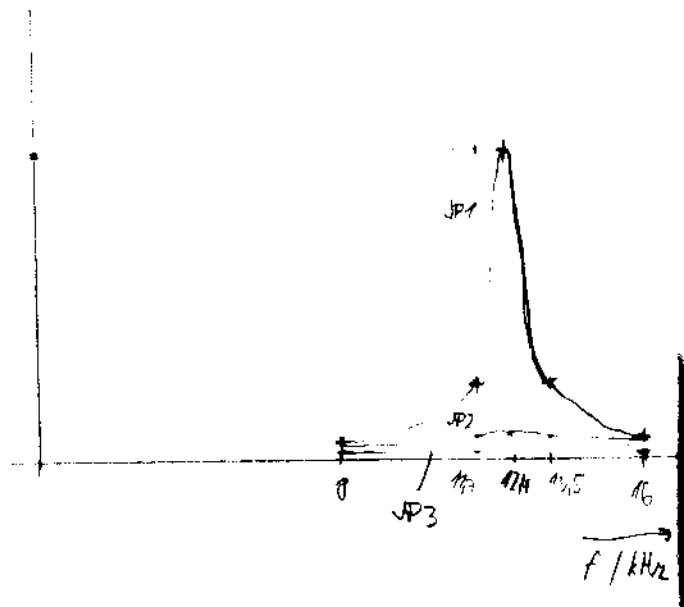
$$\vec{I} = \frac{\vec{U}_L}{Z_L} = \frac{8,1}{j \cdot 77911 \cdot 4,7 \cdot 10^{-9}} = 0,00296 e^{j\frac{\pi}{2}} \text{ A}$$

$$U_R = U$$

$$R = \frac{0,3}{0,00296} = 101 \Omega$$

$$|\vec{P}| = \left| \frac{\vec{U}_L}{\vec{U}_1} \right| = \frac{8,1}{0,3} = 27$$

$$Q = \frac{1}{\omega_r C R} = \frac{1}{77911 \cdot 4,7 \cdot 10^{-9} \cdot 101} = 27$$



Měření na RC članku

3,3 μ F
měřící sad. kvalit. měř.

$$R: U = 13,5 \text{ V}$$

$$I = 19,5 \text{ mA}$$

$$C: U = 19 \text{ V}$$

$$RC: U = 23 \text{ V}$$

$$\hat{Z}_C = \frac{1}{j\omega C}$$

$$\omega = 314 \text{ s}^{-1}$$

$$R = 692 \Omega$$

$$R = \frac{U_R}{I} = \underline{692 \Omega} \quad \checkmark$$

$$\hat{U}_C = 19 \text{ V} \quad \hat{I}_C = 0,0195 \text{ A}$$

$$\hat{U}_C = \hat{Z}_C \cdot \hat{I}_C$$

$$\hat{Z}_C = \frac{19}{0,0195 j} = -j 974,4 \Omega$$

$$\hat{Z}_C = -\frac{j}{\omega C}$$

$$-j 974,4 = -j \frac{1}{\omega C}$$

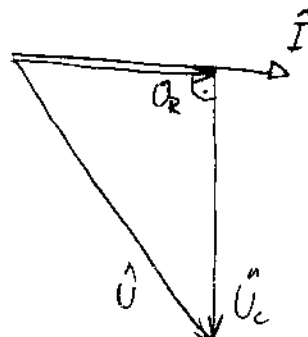
$$C = \frac{1}{314 \cdot 974,4} = \underline{3,27 \mu\text{F}} \quad \checkmark$$

$$P = U_R I = 13,5 \cdot 0,0195 = 0,263 \text{ W}$$

$$S = UI = 23 \cdot 0,0195 = 0,449 \text{ VA}$$

$$Q = \cancel{0,364} \text{ var}$$

$$\cos \varphi = \frac{0,263}{0,449} = \underline{0,586}$$



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