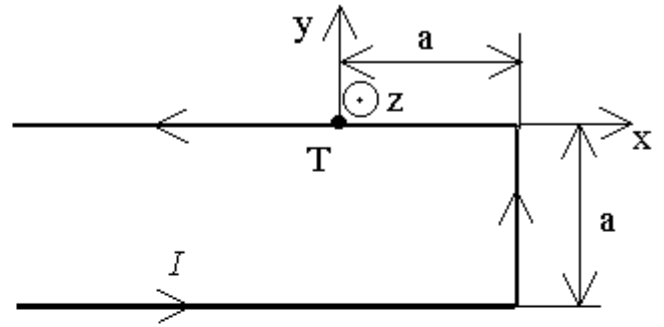


1. Določite vektor sile $\frac{d\vec{F}}{d\ell}$ na enoto dolžine v točki T pravokotno lomljenega vodnika s tokom I .



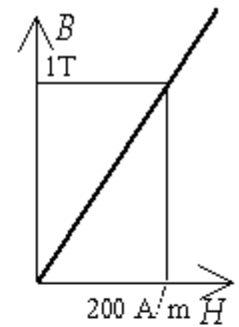
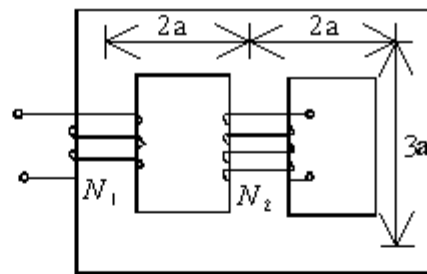
$$d\vec{F} = I d\vec{\ell} \times \vec{B} = I d\ell B (-\vec{e}_x \times \vec{e}_z) = \vec{e}_y I d\ell B$$

$$\vec{B} = \vec{B}_1 + \vec{B}_2 = \vec{e}_z \left(\frac{\mu_0 I}{4\pi a} \left(1 + \frac{\sqrt{2}}{2} \right) + \frac{\mu_0 I}{4\pi a} \cdot \frac{\sqrt{2}}{2} \right)$$

$$\vec{B} = \vec{e}_z \frac{\mu_0 I}{4\pi a} (1 + \sqrt{2})$$

$$\frac{d\vec{F}}{d\ell} = \vec{e}_y \frac{\mu_0 I^2}{4\pi a} (1 + \sqrt{2})$$

2. Dano je magnetno jedro z aproksimativno magnetilno krivuljo, $N_1 = 250$, $N_2 = 300$, $a = 10$ cm, $A = 10$ cm². Izračunajte medsebojno induktivnost obeh navitij.



$$M = \frac{\Phi_{21} N_1}{I_2}$$

$$\Phi_{21} = \frac{1}{2} \Phi_2 = \frac{1}{2} \frac{\Theta_2}{R_{m2}}$$

$$\Theta_2 = I_2 N_2$$

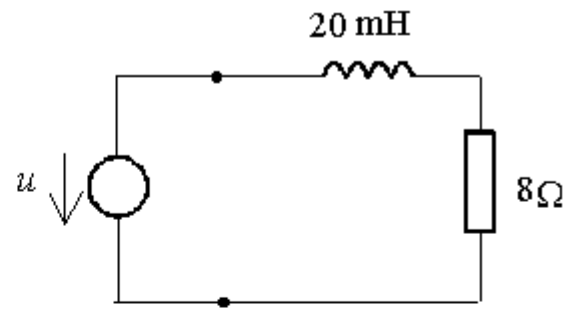
$$R_{m2} = \frac{3a}{\mu A} + \frac{1}{2} \cdot \frac{7a}{\mu A} = \frac{13a}{2\mu A}$$

$$\mu = \frac{B}{H} = \frac{1}{200} \text{ Vs/Am}$$

$$M = \frac{\mu A}{13a} N_1 N_2 = \frac{1}{200} \cdot 10^{-3} \cdot 250 \cdot 300 = 0.288 \text{ H}$$

3. Izračunajte delovno moč na bremenu;

$$u(t) = 100 \cdot \cos 300t \text{ V.}$$



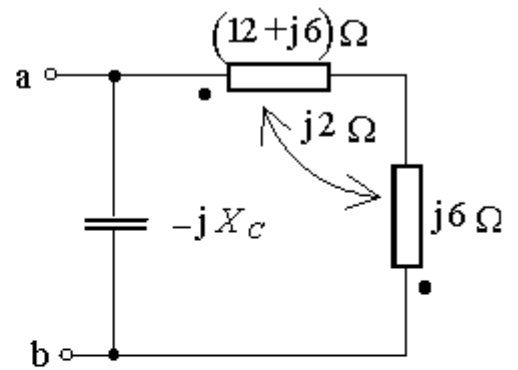
$$\underline{Z} = R + j\omega L = 8 + j6\Omega$$

$$\underline{I}_m = \frac{\underline{U}_m}{\underline{Z}} = \frac{100}{8 + j6} = 8 - j6 \text{ A}$$

$$\underline{S} = \frac{1}{2} \underline{U}_m \cdot \underline{I}_m^* = \frac{1}{2} \cdot 100 \cdot (8 + j6) = 400 + j300 \text{ VA}$$

$$P = 400 \text{ W}$$

4. Določite X_C tako, da bo vezje med sponkama a in b čisto ohmsko.



$$\underline{Z}_1 = 12 + j6 + j6 - 2 \cdot j2 = 12 + j8 \Omega$$

$$\underline{Y} = \frac{1}{-jX_c} + \frac{1}{12 + j8} = \frac{j}{X_c} + 0.058 - j0.038 = G + j0$$

$$X_c = 26 \Omega$$

5. Določite časovni potek napetosti na kondenzatorju po vklopu stikala S.

Nadomestni vir s spenk kondenzatorja

$$R_0 = 1500 \Omega$$

$$U_0 = 50 \text{ V}$$

$$U_c = U_0 \left(1 - e^{-\frac{t}{\tau}} \right)$$

$$T = R_0 C = 1500 \cdot 10^{-6} = 1.5 \cdot 10^{-3} \text{ s}$$

$$U_c = 50 \left(1 - e^{-667t} \right) \text{ V}$$

