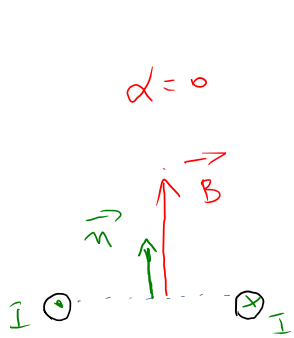
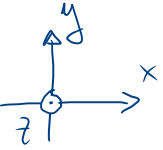


Pravougaona kontura stranice  $a$  i  $b$  nalazi se u mag. polju indukcije  $\vec{B}$  (Slika 1)

- Ako kroz konturu protiče struja  $I$  odrediti magnetni moment  $\vec{M}$  za pozicije konture na slikama 2-5.
- Odrediti  $\Phi$  kroz konturu (za ref. smer dat strujom  $I$ ) za iste pozicije.
- Odrediti EMS koja se indukuje u konturi ako se ona okreće oko  $o-o'$  ose ugaonom brzinom  $\omega$ .

Poznato je:  $a = 8 \text{ cm}$ ,  $b = 5 \text{ cm}$ ,  $B = 0,2 \text{ T}$ ,  $I = 10 \text{ mA}$ ,  $\omega = 100 \text{ rad/s}$

a)  $\vec{M} = I \vec{S} \times \vec{B} = I ab \vec{n} \times \vec{B} = (I ab B) (\vec{n} \times \vec{j}) = M_m \vec{u} \times \vec{j}$ ,  $M_m = 10 \cdot 10^{-3} \cdot 8 \cdot 10^{-2} \cdot 5 \cdot 10^{-2} \cdot 0,2$   
 $M_m = 8 \cdot 10^{-6} \text{ Nm} = 8 \mu\text{Nm}$



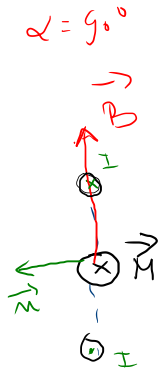
slika 2

$$\vec{n} = \vec{j}$$

$$\vec{M} = \vec{0}$$

$$\alpha = 0$$

$$\sin \alpha = 0$$



slika 3

$$\vec{n} = -\vec{i}$$

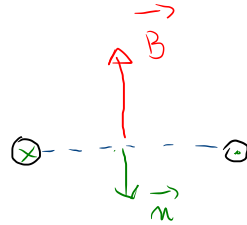
$$\vec{M} = M_m (-\vec{i} \times \vec{j})$$

$$\vec{M} = -M_m \vec{k}$$

$$\alpha = 90^\circ$$

$$\sin \alpha = 1$$

$\alpha = 180^\circ$



slika 4

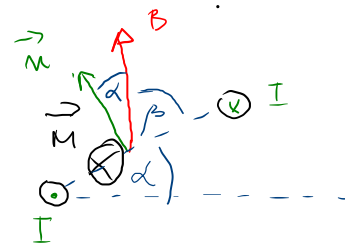
$$\vec{n} = -\vec{j}$$

$$\vec{M} = \vec{0}$$

$$\alpha = 180^\circ$$

$$\sin \alpha = 0$$

$\alpha$  - proizvoljno  
 $\beta = 90^\circ - \alpha$



slika 5

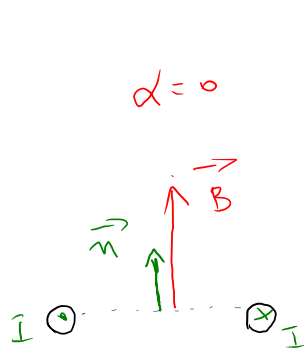
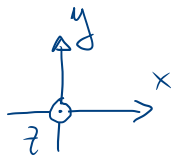
$$\vec{M} = M_m \cdot \vec{u} \times \vec{j}$$

$$\vec{M} = M_m \cdot \sin \alpha (\vec{n}, \vec{j}) (-\vec{k})$$

$$\vec{M} = -M_m \cdot \sin(\alpha) \vec{k}$$

b)  $\Phi = \vec{B} \vec{S} = B \vec{j} \cdot ab \vec{u} = abB (\vec{j} \cdot \vec{u}) = abB \cos \alpha = \Phi_m \cos \alpha$

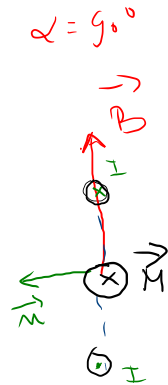
$\Phi_m = abB = 8\text{cm} \cdot 5\text{cm} \cdot 0,2\text{T} = 40 \cdot 10^{-4} \cdot 0,2 = 8 \cdot 10^{-4} \text{Wb} = 0,8 \text{mWb}$



slika 2

$\Phi = abB = \Phi_m$

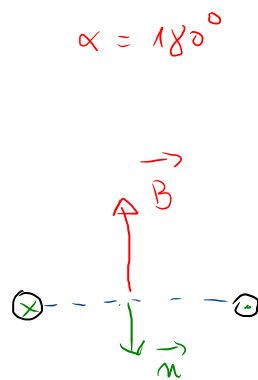
$\alpha = 0$   
 $\cos \alpha = 1$



slika 3

$\Phi = 0$

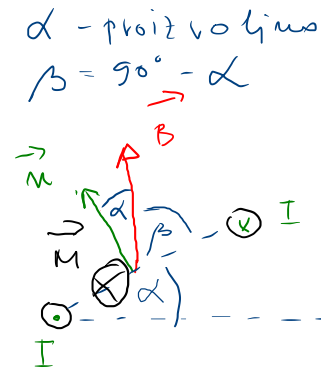
$\alpha = 90^\circ$   
 $\cos \alpha = 0$



slika 4

$\Phi = -\Phi_m$

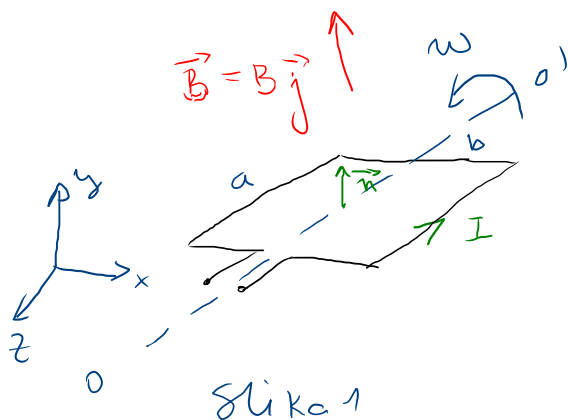
$\alpha = 180^\circ$   
 $\cos \alpha = -1$



slika 5

$\Phi = abB \cos \alpha = \Phi_m \cos \alpha$

c)



$$\Phi = \vec{B} \cdot \vec{S} = Bab \cos \alpha (\vec{B}, \vec{n})$$

$$\Phi = Bab \cos \alpha = \Phi_m \cos \alpha$$

$$\alpha = \omega t$$

$$\Phi(t) = \Phi_m \cos(\omega t)$$

$$e(t) = - \frac{d\Phi(t)}{dt} = \Phi_m \omega \sin(\omega t)$$

$$e(t) = E_m \sin(\omega t)$$

$$E_m = Bab\omega = 0,2 \cdot 40 \cdot 10^{-4} \cdot 100 = 8 \cdot 10^{-2} = 80 \text{ mV}$$

$$e(t) = 0,08 \sin(100t) \text{ V}$$