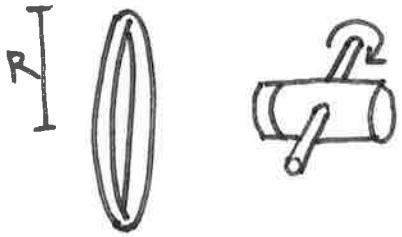
ASG vol 3 Ex 25.3 (Electro-motive force and Faraday's law)



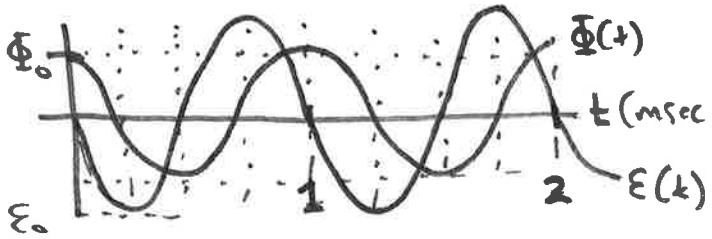
$B_0 = 1\,m\,Tesla$

$T = 1\,m\,sec$

$R = 0.01\,m$

a) $\Phi(t) = B_0 \cos(2\pi t/T) \cdot \pi R^2 = \Phi_0 \cos(2\pi t/T)$

$\Phi_0 = \pi \times 10^{-7}\ T\text{-}m^2$



b) $\mathcal{E} = -\frac{d\Phi}{dt} = -\frac{2\pi}{T} B_0 \sin(2\pi t/T) \cdot \pi R^2 = \mathcal{E}_0 \sin(2\pi t/T)$

$\mathcal{E}_0 = 0.00197$

c) $\mathcal{E}_0 =$ **2 mVolts**

d) for $f = 60\,Hz$, $T = \frac{1}{60\,Hz} = 0.0167\ sec =$ **17 m Sec**

for $\mathcal{E}_0 = 170$, $B_0 = \frac{\mathcal{E}}{\frac{2\pi}{T}\pi R^2} = \frac{170 \cdot 60}{2\pi^2 (0.01)^2}$

$B_0 = 5 \times 10^6$ Tesla. Too big!