

2012 FEB 29

FARADAY'S LAW

$$\mathcal{E} = -N \frac{\Delta \Phi_B}{\Delta t}$$

EMF AROUND THE LOOP (CLOCKWISE OR COUNTERCLOCKWISE)

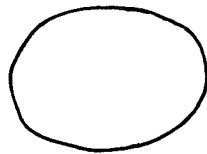
NUMBER OF TURNS ~~OF~~ IN THE LOOP (N=1 FOR A SIMPLE LOOP)

MAGNETIC FLUX THROUGH THE LOOP

TIME

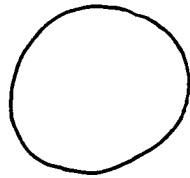
REMINDER TO APPLY LENZ'S LAW

SETTING: NEED A REAL OR IMAGINARY LOOP



(66, ch 21, p 4)

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$$B_i = 1.10 \text{ T}$$

$$B_f = 0$$

$$\Phi_{B_i} = B_i A \cos \theta$$

$$= (1.10 \text{ T}) \pi (0.048 \text{ m})^2 \cos 0$$

$$= 0.0079 \text{ Wb}$$

$$\Phi_{B_f} = 0$$

$$\mathcal{E} = -N \frac{\Delta \Phi_B}{\Delta t} = (1) \frac{0.0079 \text{ Wb}}{0.15 \text{ s}} = 0.053 \text{ V}$$

(66, Ch 21, P 16)

$$B = \frac{\mu_0 N I}{l}$$

$$B_i = 0$$

$$B_f = \frac{(4\pi \times 10^{-7} \text{ T}\cdot\text{m/A})(500)(5.0\text{A})}{(0.25\text{m})} = 0.013 \text{ T}$$

$$\Phi_{B_i} = 0$$

$$\Phi_{B_f} = B_f A \cos \theta = (0.013 \text{ T}) \pi (0.0125 \text{ m})^2 \cos 0$$
$$= 6.169 \times 10^{-6} \text{ Wb}$$



$$\mathcal{E} = -N \frac{\Delta \Phi_B}{\Delta t} = (10) \frac{6.169 \times 10^{-6} \text{ Wb}}{0.6 \text{ s}}$$

$$= 1.03 \times 10^{-4} \text{ V}$$

LENZ'S LAW

- RULE TO FIGURE DIRECTION OF EMF
IN FARADAY'S LAW

"NATURE ABHORS A CHANGE IN MAGNETIC FLUX"

IF IT CAN, NATURE WILL CREATE (INDUCE)

A CURRENT WHOSE MAGNETIC FIELD

WILL OPPOSE THE CHANGE IN MAGNETIC FLUX.