

Homework 7

① $A = 0.1 \text{ m}^2$, $l = 0.25 \text{ m}$, $B = 1.2 \sin 377t$
 $N_1 = 100$, $N_2 = 300$

$$V_1 = -N \frac{d\psi_m}{dt} = -NA \frac{dB}{dt} = -100 \times 0.1 \times 1.2 \times 377 \times \cos \omega t = 4524 \cos \omega t$$

$$V_2 = \frac{300}{100} V_1 = 13572 \cos(377t)$$

$$I_2 = \frac{V_2}{R_2} = \frac{13572 \cos(377t)}{50} = 271.4 \cos 377t$$

$$I_1 = \frac{N_2}{N_1} I_2 = 814.3 \cos 377t$$

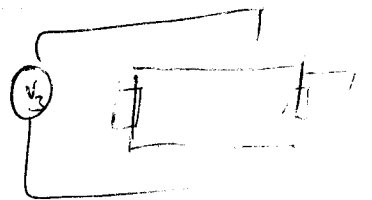
②

$$E = -\frac{d\psi}{dt} = -\frac{d}{dt} (0.2t \times 1 \text{ m}^2) = 0.2 \text{ V}$$

$$I = \frac{E}{2+1} = 0.066$$

$$V_1 = I \times 1 = 0.066$$

$$V_2 = I \times 2 = 0.133$$



for V_3 $E_2 = -\frac{d\psi}{dt} = -\frac{d}{dt} (.2t) = 0.2 \text{ V}$

$$V_3 = E_2 - V_1 = 0.2 - 0.066 = 0.133$$

$$\Psi_m = \int B \cdot dS = \int_{z_0}^{z_0+L} B_0 z L dz$$

$$= B_0 L \left(\frac{z^2}{2} \right)_{z_0}^{z_0+L}$$

$$B_0 L \left(\frac{(z_0+L)^2}{2} - \frac{z_0^2}{2} \right)$$

$$\frac{B_0 L}{2} \left[\cancel{z_0^2} + 2Lz_0 + L^2 - \cancel{z_0^2} \right]$$

$$\frac{d\Psi}{dt} = B_0 L^2 \frac{dz}{dt} = B_0 L^2 U$$

Second method

$$\Sigma = B_0 z L U - B_0 (z+L) L U$$

$$= B_0 L^2 U$$

$$4. \quad \psi_m = \int B \cdot dS = \int_{0.05}^{0.15} \frac{\mu_0 I \cdot l}{2\pi r}$$

$$= 5.5 \times 10^{-8} \cos(2\pi \times 10^4 t)$$
$$\mathcal{E} = -\frac{d\psi_m}{dt} = 3.45 \times 10^{-3} \sin(2\pi \times 10^4 t)$$

$$I = \frac{\mathcal{E}}{R} = 1.72 \times 10^{-4} \sin(2\pi \times 10^4 t)$$