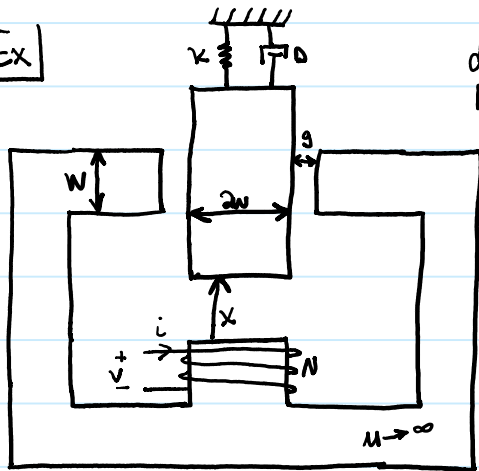


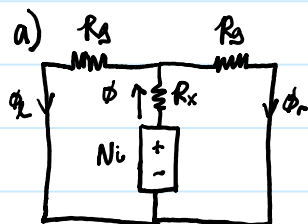
Ex



depth d into
page

Find: a) ϕ in middle leg
b) v

Solution:



$$R_x = \frac{X}{u_0(2w)d} = \frac{X}{2u_0 wd}$$

$$R_g = \frac{g}{\mu_0 \omega d}$$

By symmetry: $\phi_1 = \phi_2 = \phi_3$

$$\phi = \phi_2 + \phi_r \Rightarrow \phi = 2\phi_0$$

$$N\dot{\phi} = R_x \phi + R_g \phi_0 \Rightarrow N\dot{\phi} = R_x \phi + R_g \left(\frac{\phi}{2}\right)$$

$$N_{\dot{u}} = \phi \left(\frac{x}{2u_{\text{wind}}} + \frac{g}{2u_{\text{wind}}} \right) \Rightarrow N_{\dot{u}} = \phi \left(\frac{g+x}{2u_{\text{wind}}} \right)$$

$$\phi = \left(\frac{2\mu_0 w d N}{g+x} \right) i$$

$$b) \lambda = N\phi \Rightarrow \lambda = \left(\frac{2\mu_0 w d N^2}{g+x} \right) \phi$$

$$V = \frac{d\lambda}{dt} \Rightarrow V = \left(\frac{2\mu_0 \omega d N^2}{g+x} \right) \frac{di}{dt} + \left(\frac{-2\mu_0 \omega d N^2}{(g+x)^2} \right) i \frac{dx}{dt}$$