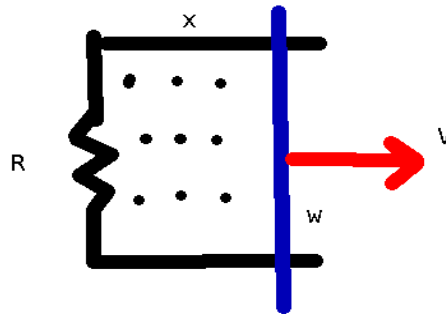


Physics 250: Unquiz 06

A bar of width w is on conducting rails with a resistance R . A magnetic field B is directed outward as shown. The bar has an instantaneous position given by:

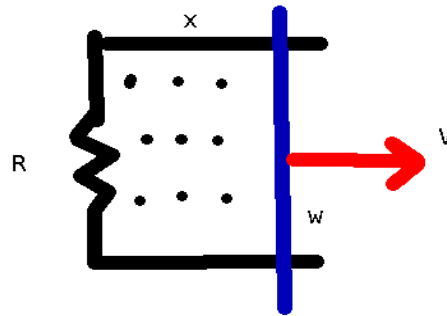
$$x = x_0 + ct^3 \quad \text{where } c \text{ is a positive constant with dimensions of } [L]/[t]^3.$$

- (a) does the induced current circulate clockwise or counterclockwise?
- (b) Find the magnitude of the induced emf
- (c) find the magnitude of the induced current.



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The current circulates clockwise.

$$\text{emf} = -\frac{d\phi}{dt} : \phi = \iint \vec{B} \cdot d\vec{A} = \iint B dA = B \iint dA = BW(x_0 + ct^3) = BW(x_0 + ct^3)$$

$$\frac{d\phi}{dt} = BW(3ct^2)$$

$$\Rightarrow \text{emf} = -BW(3ct^2) \Rightarrow |\text{emf}| = BW(3ct^2)$$

$$\text{emf} = IR \Rightarrow I = \frac{\text{emf}}{R} = \frac{BW(3ct^2)}{R}$$