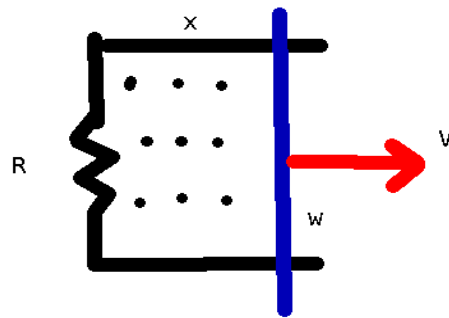


Physics 250: Unquiz 06

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:

$$x = x_0 + vt$$

- (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.



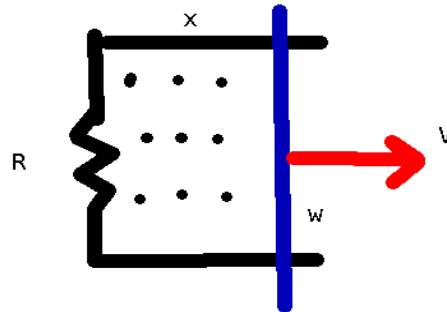
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The current circulates clockwise.

$$\begin{aligned} \text{emf} &= \frac{-d\phi}{dt} : \phi = \iint \vec{B} \cdot d\vec{A} = \iint B dA = B \iint dA = BW(x_0 + vt) = Bw(x_0 + vt) : \frac{d\phi}{dt} = BVW \\ \Rightarrow \text{emf} &= -BVW \Rightarrow |\text{emf}| = BVW \\ \text{emf} &= IR \Rightarrow I = \frac{\text{emf}}{R} = \frac{BVW}{R} \end{aligned}$$

