$$\vec{F}_{ind} = \frac{I_{ind}}{c} \vec{w} \times \vec{B} =$$

$$= \frac{I_{ind}}{c} w (-\hat{x}) \times (-\hat{y}) =$$

$$= \frac{I_{ind}}{c} w B \hat{z} = -\frac{1}{Rc^2} B^2 w^2 v(t) \hat{z}$$

- when $v(t) = v_{terminal}$, $\vec{a} = 0$.

Therefore

$$0 = \vec{F} = -\frac{1}{Rc^2} B^2 w^2 v_{terminal} - mg$$

$$v_{terminal} = -\frac{mg Rc^2}{B^2 w^2} < 0$$