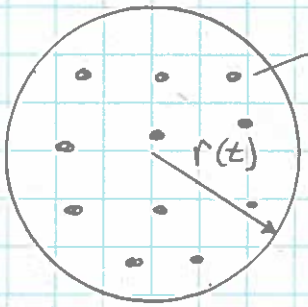

$r(t) = r_0 e^{-\beta t}$

Induced EMF:

$$\mathcal{E} = \left| \frac{d\Phi_m}{dt} \right|$$

where: $\Phi_m = \int \vec{B} \cdot d\vec{A} = BA = B\pi r^2$

$$= B\pi (r_0 e^{-\beta t})^2$$

$$= B\pi r_0^2 e^{-2\beta t}$$

So:

$$\mathcal{E} = \left| \frac{d}{dt} \left(B\pi r_0^2 e^{-2\beta t} \right) \right|$$

$$= B\pi r_0^2 \left| (-2\beta) e^{-2\beta t} \right|$$

$$\therefore \mathcal{E} = 2\beta B\pi r_0^2 e^{-2\beta t}$$