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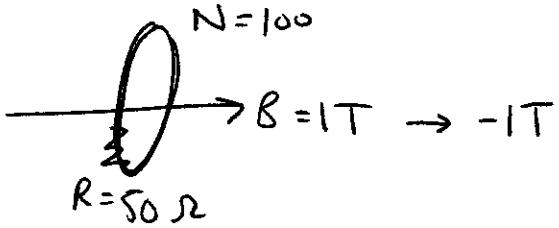
QUIZ 7: Magnetic Induction

A 100 turn circular coil has a diameter of 2.0 cm and resistance of 50 Ω. The plane of the coil is perpendicular to a uniform magnetic field of magnitude 1.0 T. The direction of the field is suddenly reversed. If the reversal takes 0.1s, find (a) the emf in the coil and (b) the current in the coil.



$r = 0.01\,m$, $A = \pi r^2$

induced emf $= \mathcal{E} = N\frac{\Delta\Phi_m}{\Delta t} = \frac{(100)(2T)(\pi)(0.01m)^2}{(0.1s)}$

$$\boxed{\mathcal{E} = 0.628\,V}$$

Ohm's Law: $\Delta V = IR$

$$\frac{\mathcal{E}}{R} = I$$

$$\Rightarrow I = \frac{0.628\,V}{50\,\Omega} = 0.0126\,A$$

$$\boxed{I = 12.6\,mA}$$