Answer on Question #48518-Physics-Electromagnetism

A $n = 30$-turn coil, with a resistance $R = 9\ ohms$ and area of $A = 0.02\ m^2$, is in a magnetic field if $B_1 = 2T$, perpendicular to the coil's plane. Magnetic field is $B_2 = 3T$ in $\Delta t = 5s$.

How do I apply Faraday law to find the induced current?

Solution

Aaccording to Faraday's law of electromagnetic induction, the rate of change of flux linkage is equal to induced emf:

$$\varepsilon = n\left|\frac{d\Phi}{dt}\right|,$$

where $\Phi = \mathrm{BA}$ is magnetic flux.

The induced current is

$$I = \frac{\varepsilon}{R} = \frac{n}{R}\frac{d\Phi}{dt} = \frac{n}{R}\frac{(B_2 - B_1)A}{\Delta t} = \frac{30}{9}\frac{(3-2)0.02}{5} = 0.013\ A = 13\ mA.$$

Answer: $\mathbf{13\ mA}$.