

Answer on Question #82350, Physics / Electromagnetism

Question:

Find magnitude of charge passing through coil when area is $5 \cdot 10^3 \text{m}^2$, number of turns is 10, and resistance is 10ohms with its plane at right angles to a uniform magnetic field $B = 0.08\text{T}$

Solution:

In accordance with Faraday's law $\mathcal{E} = \frac{d\Phi}{dt}$ and the current $I = \frac{\mathcal{E}}{R}$. Then

$$q = \int Idt = \int \frac{d\Phi}{Rdt} dt = \frac{\Delta\Phi}{R} = \frac{BSN}{R}, \text{ respectively } q = \frac{0.08 \cdot 5 \cdot 10^3 \cdot 10}{10} = 400(C).$$

The answer:

$$q = \frac{BSN}{R} = 400C$$

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