

Answer on Question #83876, Physics / Electromagnetism

Question:

A coil of wire with 50 turns and 10 cm diameter is placed perpendicularly to a uniform magnetic field of 0.03 T. Calculate the induced e.m.f. if the coil is flipped 60 degree in 30 ms. The coil is connected to an electrical instrument that has resistance of 35 ohm. Calculate the induced current flows in the coil.

Solution:

According to Faraday's law e.m.f. $E = \frac{\pi d^2 n}{4\tau} B(1 - \cos 60^\circ) = \frac{3.14 \cdot 0.01 \cdot 50 \cdot 0.03 \cdot 0.5}{4 \cdot 0.03} = 0.20$

(V). The induced current $I = \frac{E}{R} = \frac{0.2}{35} = 5.7$ (mA).

The answer:

E.m.f. $E = \frac{\pi d^2 n}{4\tau} B(1 - \cos 60^\circ) = 0.20$ V.

The induced current $I = \frac{E}{R} = 5.7$ mA.

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