Answer on Question #56079-Physics-Electromagnetism

A 105-turn circular coil of radius 2.31 cm is immersed in a uniform magnetic field that is perpendicular to the plane of the coil. During 0.185 s the magnetic field strength increases from 52.9 mT to 92.3 mT. Find the magnitude of the average EMF, in millivolts, that is induced in the coil during this time interval.

Answer should be in mV

Solution

Faraday's law of induction:

$$EMF = -NA\frac{\Delta B}{\Delta t}$$

$$A = \pi r^2$$

The magnitude of the average EMF, in millivolts, that is induced in the coil during this time interval is

$$|EMF| = N\pi r^2\frac{\Delta B}{\Delta t} = 105\pi(2.31\cdot 10^{-2}m)^2\frac{(92.3\ mT - 52.9\ mT)}{0.185\ \text{s}} = 37.5\ mV.$$

Answer: 37.5 mV.