Answer on Question #60034-Physics-Electromagnetism

a .25 meter long coil consist of 560 square turns 6.5 cm on a side the coil is placed in a uniform magnetic field of strength 1.2 teslas. Initially the coil is oriented so that its axis coincides with the magnetic field direction. The coil is then rotated 90 degrees about an axis perpendicular to the magnetic field direction in .20 milliseconds. What is the magnitude of the emF induced in the coil?

Solution

$$\varepsilon_{ind} = \left|\frac{\Delta\Phi}{\Delta t}\right| = n\frac{\mathrm{B}\Delta\mathrm{A}}{\Delta t} = \frac{nB}{\Delta t}(aL - a^2) = \frac{nBa}{\Delta t}(L - a) = \frac{560 \cdot 1.2 \cdot 0.065}{0.20 \cdot 10^{-3}}(0.25 - 0.065) = 40\ kV.$$

Answer: 40 kV.