

104. The magnetic flux Φ_B through the loop is given by $\Phi_B = 2B(\pi r^2/2)(\cos 45^\circ) = \pi r^2 B/\sqrt{2}$. Thus

$$\begin{aligned}\mathcal{E} &= -\frac{d\Phi_B}{dt} = -\frac{d}{dt} \left(\frac{\pi r^2 B}{\sqrt{2}} \right) = -\frac{\pi r^2}{\sqrt{2}} \left(\frac{\Delta B}{\Delta t} \right) \\ &= -\frac{\pi(3.7 \times 10^{-2} \text{ m})^2}{\sqrt{2}} \left(\frac{0 - 76 \times 10^{-3} \text{ T}}{4.5 \times 10^{-3} \text{ s}} \right) \\ &= 5.1 \times 10^{-2} \text{ V} .\end{aligned}$$

The direction of the induced current is clockwise when viewed along the direction of \vec{B} .