

Problem 6.12 The electromagnetic generator shown in Fig. 6-12 is connected to an electric bulb with a resistance of $150\ \Omega$. If the loop area is $0.1\ \text{m}^2$ and it rotates at 3,600 revolutions per minute in a uniform magnetic flux density $B_0 = 0.4\ \text{T}$, determine the amplitude of the current generated in the light bulb.

Solution: From Eq. (6.38), the sinusoidal voltage generated by the a-c generator is $V_{\text{emf}} = A\omega B_0 \sin(\omega t + C_0) = V_0 \sin(\omega t + C_0)$. Hence,

$$V_0 = A\omega B_0 = 0.1 \times \frac{2\pi \times 3,600}{60} \times 0.4 = 15.08\ (\text{V}),$$
$$I = \frac{V_0}{R} = \frac{15.08}{150} = 0.1\ (\text{A}).$$
