

Problem 5.30 In the model of the hydrogen atom proposed by Bohr in 1913, the electron moves around the nucleus at a speed of 2×10^6 m/s in a circular orbit of radius 5×10^{-11} m. What is the magnitude of the magnetic moment generated by the electron's motion?

Solution: From Eq. (5.69), the magnitude of the orbital magnetic moment of an electron is

$$|m_0| = \left| -\frac{1}{2} e v r \right| = \frac{1}{2} \times 1.6 \times 10^{-19} \times 2 \times 10^6 \times 5 \times 10^{-11} = 8 \times 10^{-24} \quad (\text{A} \cdot \text{m}^2).$$
