

61. We use $R/L = \rho/A = 0.150 \Omega/\text{km}$.

- (a) For copper $J = i/A = (60.0 \text{ A})(0.150 \Omega/\text{km})/(1.69 \times 10^{-8} \Omega \cdot \text{m}) = 5.32 \times 10^5 \text{ A/m}^2$; and for aluminum $J = (60.0 \text{ A})(0.150 \Omega/\text{km})/(2.75 \times 10^{-8} \Omega \cdot \text{m}) = 3.27 \times 10^5 \text{ A/m}^2$.
- (b) We denote the mass densities as ρ_m . For copper $(m/L)_c = (\rho_m A)_c = (8960 \text{ kg/m}^3)(1.69 \times 10^{-8} \Omega \cdot \text{m})/(0.150 \Omega/\text{km}) = 1.01 \text{ kg/m}$; and for aluminum $(m/L)_a = (\rho_m A)_a = (2700 \text{ kg/m}^3)(2.75 \times 10^{-8} \Omega \cdot \text{m})/(0.150 \Omega/\text{km}) = 0.495 \text{ kg/m}$.