

62. The magnetic energy stored in the toroid is given by $U_B = \frac{1}{2}Li^2$, where L is its inductance and i is the current. By Eq. 31-56, the energy is also given by $U_B = u_B\mathcal{V}$, where u_B is the average energy density and \mathcal{V} is the volume. Thus

$$i = \sqrt{\frac{2u_B\mathcal{V}}{L}} = \sqrt{\frac{2(70.0 \text{ J/m}^3)(0.0200 \text{ m}^3)}{90.0 \times 10^{-3} \text{ H}}} = 5.58 \text{ A} .$$