

68. Using Appendix C, we find that the contraction is

$$\begin{aligned} |\Delta L| &= L_0 - L = L_0 \left(1 - \frac{1}{\gamma} \right) = L_0 (1 - \sqrt{1 - \beta^2}) \\ &= 2(6.370 \times 10^6 \text{ m}) \left(1 - \sqrt{1 - \left(\frac{3.0 \times 10^4 \text{ m/s}}{2.998 \times 10^8 \text{ m/s}} \right)^2} \right) \\ &= 0.064 \text{ m} . \end{aligned}$$

The discussion in Sample Problem 38-7 dealing with numerical considerations may prove helpful for those whose calculators do not yield this answer.