3 Electromagnetism

3.1 Wire in a Magnetic Field

For zero tension, the magnetic force must balance the gravitational force.

$$\begin{aligned} F_m &= F_g \\ ILB &= mg \\ I(0.5)(0.04) &= (0.02)(9.81) \\ I &= \frac{0.1962}{0.02} = \mathbf{9.81}\ \text{A} \end{aligned}$$

Using the right-hand rule, for an upward force with $\vec{B}$ into the page, the current must flow **from A to B**. The potential difference is $V = IR = (9.81)(1.2) = \mathbf{11.77}$ V.