

PROBLEM 5-53

USE WORK-ENERGY THEOREM TO FIND TOTAL WORK DONE. NOTE THAT WORK IS DONE TO OVERCOME FRICTION (CONTACT OF TRAIN WHEELS WITH TRACK)

$$W_{nc} = (KE_f + PE_f) - (KE_i + PE_i)$$

$$PE_i = PE_f = 0$$

$$KE_f = \frac{1}{2} m v_f^2$$

$$KE_i = \frac{1}{2} m v_i^2 = 0$$

$$\begin{aligned} \Rightarrow W_{nc} &= \frac{1}{2} m v_f^2 = \frac{1}{2} (0.875 \text{ kg}) (0.620 \text{ m/s})^2 \\ &= 0.168 \text{ J} \end{aligned}$$

POWER DELIVERED BY MOTOR IS

$$P = \frac{W_{nc}}{\Delta t} = \frac{0.168 \text{ J}}{0.021 \text{ s}} = \boxed{8.01 \text{ W}}$$