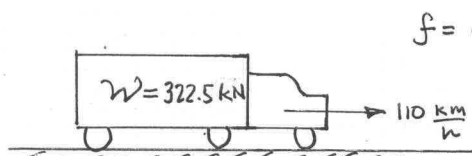


PROBLEM 2.21

KNOWN: The force associated with the rolling resistance of the tires of a truck is known as a function of the truck weight.

FIND: Determine the power required by the truck to overcome rolling resistance.

SCHEMATIC & GIVEN DATA:



ENGR. MODEL: The truck is the system.

ANALYSIS: Applying Eq. 2.13, the power required to overcome rolling resistance is

$$\dot{W}_r = F_r \cdot V = (fW)V$$

$$= (0.0069) \left(322.5 \text{ kN} \left| \frac{10^3 \text{ N}}{1 \text{ kN}} \right| \right) \left(110 \frac{\text{km}}{\text{h}} \left| \frac{10^3 \text{ m}}{1 \text{ km}} \right| \left| \frac{1 \text{ h}}{3600 \text{ s}} \right| \right) \left| \frac{1 \text{ kJ}}{10^3 \text{ N} \cdot \text{m}} \right| \left| \frac{1 \text{ kW}}{1 \text{ kJ/s}} \right|$$

$$= 68 \text{ kW}$$

$$\leftarrow \dot{W}_r$$