

Locomotive Coriolis Wear Force

Given: train traveling north at 45 deg latitude

Find: side force on wheels due to Coriolis effects

Angular speed of the earth: $\omega_e := \frac{360 \cdot \text{deg}}{1 \cdot \text{day}}$

Speed of Train: $v_{\text{rel}} := 60 \cdot \frac{\text{mi}}{\text{hr}}$

Weight and mass of train car: $\underline{W} := 50 \cdot \text{ton}$ $\underline{m} := \frac{W}{g}$

Coriolis acceleration: $a_{\text{cor}} := 2 \cdot \omega_e \cdot v_{\text{rel}} \cdot \sin(45 \cdot \text{deg})$

Side force on train car: $F_{\text{side}} := m \cdot a_{\text{cor}}$ $F_{\text{side}} = 28.129 \text{ lb}$