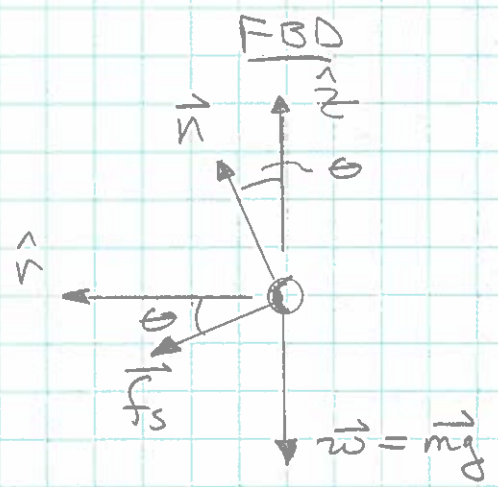


impending motion
static friction
rubber/concrete
 M_s



a.) Centripetal force in the \hat{r} components of f_s & n .

b.) find: maximum speed to not skid.

$$\sum F_r = mar$$

$$f_s \cos \theta + n \sin \theta = \frac{mv^2}{r} \quad (\text{for UCM})$$

and

$$v = v_{\max} \text{ when } f_s = f_{s\max} = M_s n$$

$$\text{So } \therefore M_s n \cos \theta + n \sin \theta = \frac{mv^2}{r} \quad (1)$$

$$\text{Now: } \sum F_z = 0$$

$$n \cos \theta - f_s \sin \theta - w = 0$$

$$\text{Or, } n \cos \theta - M_s n \sin \theta - mg = 0$$

$$\text{So: } n = \frac{mg}{\cos \theta - M_s \sin \theta}$$

$$\text{Now, equate (1) in: } n (M_s \cos \theta + \sin \theta) = \frac{mv^2}{r}$$

$$\text{So: } mg \left(\frac{M_s \cos \theta + \sin \theta}{\cos \theta - M_s \sin \theta} \right) = \frac{mv^2}{r}$$

$$v = \left\{ r g \left(\frac{M_s \cos \theta + \sin \theta}{\cos \theta - M_s \sin \theta} \right) \right\}^{1/2}$$

NOTE: For $\theta \rightarrow 0$, same as WB8-3