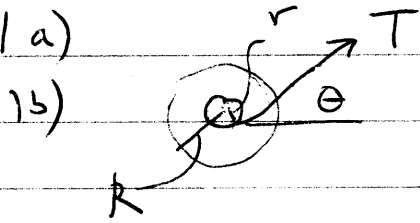


Solutions of Homework set 11

1a)



$$T \sin \theta < (m + 2M) g$$

1b)

$$I = m r^2 + 2 \frac{1}{2} M R^2 = m r^2 + M R^2$$

1c)

$$T \cos \theta - F_{fr} = (m + 2M) a \quad a =$$

$$T r - F_{fr} R = -I a$$

$$\Rightarrow T r = (T \cos \theta - (m + 2M) a) R + I \left(-\frac{a}{R} \right)$$

$$T(r - R \cos \theta) = a \left(-3MR - mR - m \frac{r^2}{R} \right)$$

$$\Rightarrow a = \frac{T(r - R \cos \theta)}{-3MR - m \frac{r^2}{R} - mR}$$

$$a > 0 \quad \text{if } \cos \theta > \frac{r}{R}$$

$$a < 0 \quad \text{if } \cos \theta < \frac{r}{R}$$

1d)

$$F_{fr} = T \cos \theta - (m + 2M) \frac{T(r - R \cos \theta)}{-3MR - m \frac{r^2}{R} - mR}$$

normal force

↓

$$N = (m + 2M) g - T \sin \theta$$

$$\text{no slipping if } F_{fr} < \mu N$$

$$\mu > \frac{F_{fr}}{N}$$