$$\frac{\mu\cos\alpha - \sin\alpha}{\mu\sin\alpha + \cos\alpha} = \frac{-T}{mg}$$

$$mg\mu\cos\alpha - mg\sin\alpha = -T\sin\alpha - T\cos\alpha$$

$$\mu(mg\cos\alpha + T\sin\alpha) = mg\sin\alpha - T\cos\alpha$$

$$\mu = \frac{mg\sin\alpha - T\cos\alpha}{mg\cos\alpha + T\sin\alpha}$$

$$= \frac{mg\sin\alpha - mg\sin\alpha / 1+\cos\alpha}{mg\cos\alpha + \frac{mg\sin\alpha}{1+\cos\alpha}(\sin\alpha)}$$

$$= \frac{mg\cos\alpha}{mg\cos\alpha + mg} = \frac{\cos\alpha}{\cos\alpha + 1}$$

$$\mu \geq \frac{\cos\alpha}{1+\cos\alpha}$$