

$$V_c^2 = U^2 + a^2\dot{\theta}^2 + 2Ua\dot{\theta}\sin\theta$$

$$T^* = \frac{1}{2}m(U^2 + a^2\dot{\theta}^2 + 2Ua\dot{\theta}\sin\theta) + \frac{1}{2}I_c\dot{\theta}^2$$

NOTE: T^* written strictly in terms of $\theta, \dot{\theta}$

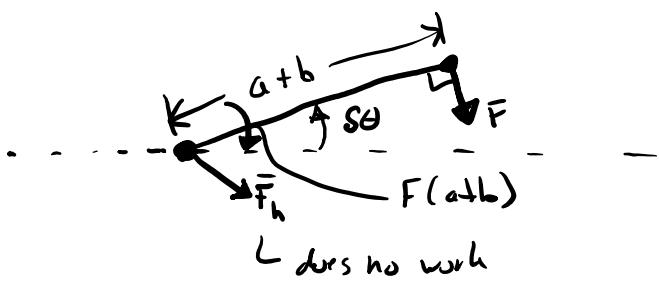
Potential Energy, V

$$V=0$$

Generalized Force, Ξ_θ

$$\delta W = \Xi_\theta \delta\theta$$

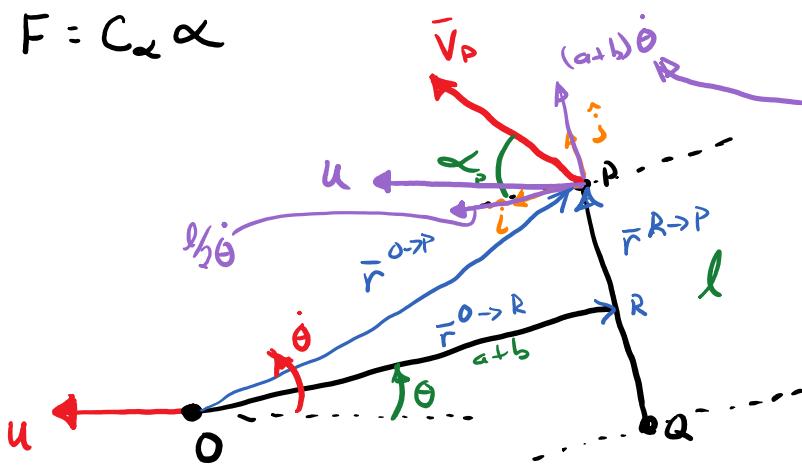
$$\delta W = -F(a+b) S\theta$$



$$\Xi_\theta$$

$$F = ?$$

$$F = C_\alpha \alpha$$



$$\begin{aligned} \bar{v}_P &= \bar{v}_O + \bar{\omega} \times \bar{r}^{O \rightarrow P} \\ \bar{v}_P &= \bar{v}_O + \bar{\omega} \times \bar{r}^{O \rightarrow R} + \bar{\omega} \times \bar{r}^{R \rightarrow P} \\ \bar{v}_P &= (\bar{u} \cos \theta + \frac{1}{2} \dot{\theta}) \hat{i} + \\ &\quad (\bar{u} \sin \theta + (a+b) \dot{\theta}) \hat{j} \end{aligned}$$

0

$$\tan \omega_p = \frac{U \sin \theta + (a+b) \dot{\theta}}{U \cos \theta + l_2 \dot{\theta}} = \frac{\bar{V}_p \cdot \hat{j}}{\bar{V}_p \cdot \hat{i}}$$

$$\tan \omega_p \approx \omega_p = \frac{U \theta + (a+b) \dot{\theta}}{U + l_2 \dot{\theta}} = \frac{U \theta + (a+b) \dot{\theta}}{U} = \boxed{\theta + (a+b) \frac{\dot{\theta}}{U}}$$

$U \gg l_2 \dot{\theta}$

$$F_p = C_\alpha^* \omega_p$$

$$\omega_q = \frac{U \theta + (a+b) \dot{\theta}}{U - l_2 \dot{\theta}} = \theta + (a+b) \frac{\dot{\theta}}{U}$$

$$F_q = C_\alpha^* \omega_q$$

$$\omega = \omega_q = \omega_p$$

$$F = F_p + F_q = 2C_\alpha^* \omega$$

$$F = C_\alpha \omega$$

Cornering coefficient
of singk tire

$$F = C_\alpha \theta + C_\alpha (a+b) \dot{\theta} / U$$

F is the total lateral force from two wheels.

$$\frac{d}{dt} \frac{\partial T^*}{\partial \dot{\theta}} - \frac{\partial T^*}{\partial \theta} + \frac{\partial V}{\partial \theta} = \underline{\underline{\sigma}}_\theta$$

ksi

$$T^* = \frac{1}{2} m (u^2 + a^2 \dot{\theta}^2 + 2ua \dot{\theta} \sin\theta) + \frac{1}{2} I_c \dot{\theta}^2$$

$F(t)$ is a function of time.