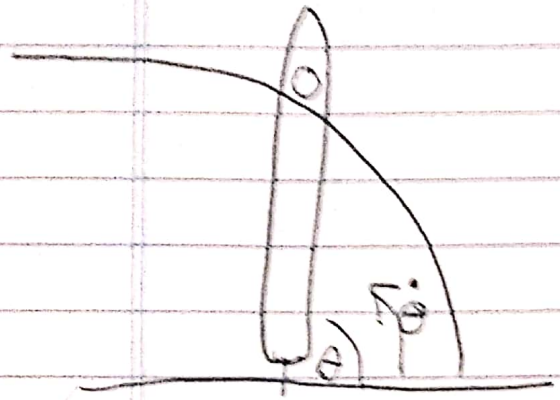
Date



$r = e^{k\theta}$

$\dot{\theta} = C$

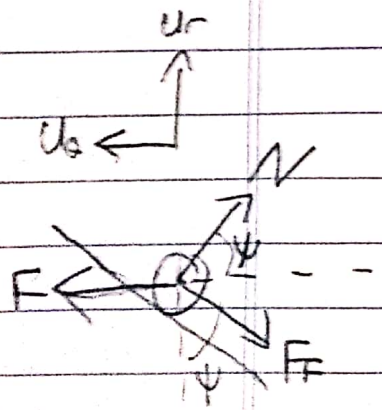
given μ, m, θ

$\theta = \theta$
$\dot{\theta} = C$
$\ddot{\theta} = 0$

$r = e^{k\theta}$
$\dot{r} = k e^{k\theta}\dot{\theta}$
$\ddot{r} = k^2 e^{k\theta}\dot{\theta}^2 + k e^{k\theta}\ddot{\theta}^{\,0}$

$dr/d\theta = k e^{k\theta}$

$\tan\psi = \frac{r}{dr/d\theta} = \frac{1}{k}$ $\quad \psi = \tan^{-1}\left(\frac{1}{k}\right)$



$a_\theta = 2\dot{r}\dot{\theta} = (F - \sin\psi F_F - \cos\psi N)/m$
$a_r = \ddot{r} - r\dot{\theta}^2 = (\sin\psi N - \cos\psi F_F)/m$
$F = \mu N$

$\downarrow$

$N = m(\ddot{r} - r\dot{\theta}^2)/(\sin\psi - \mu\cos\psi)$

$F = m(2\dot{r}\dot{\theta}) + (\cos\psi + \mu\sin\psi)N$