

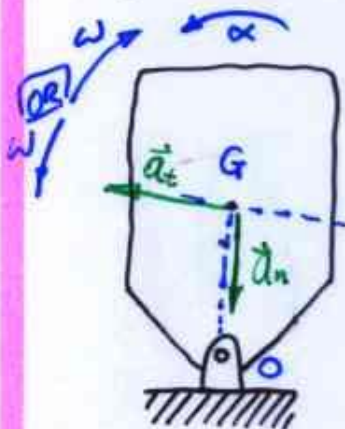
PLANE KINETICS OF RIGID BODIES

(F1)

Last week we looked at TRANSLATION

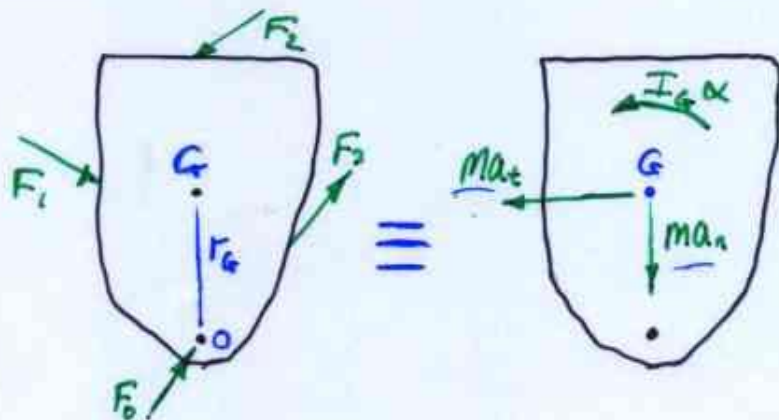
THIS WEEK: FIXED AXIS ROTATION

ALL POINTS ON BODY MOVE ALONG CIRCLES WITH A COMMON CENTRE at the axis of rotation



$$a_n = r_G \omega^2$$

$$a_t = r_G \alpha$$



N.B. note that a force occurs at O

As before we can write

$$\sum \vec{F} = m \vec{a}_G$$

vector sum combination

$$\sum M_G = I_G \alpha$$

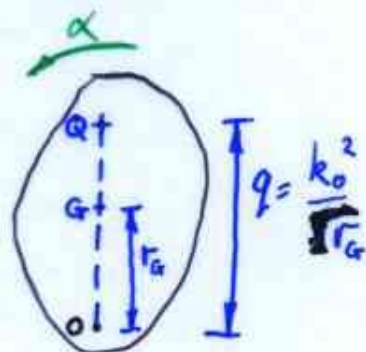
SCALAR BECAUSE 2D PROB

Often handier to sum moments about O

$$\Rightarrow \sum M_O = I_O \alpha \quad (\text{derived last week})$$

Center of Percussion

combine resultant force $m a_t$ and moment $I_G \alpha$ by moving $m a_t$ to a parallel pos'n @ point Q



$$m \overbrace{r_G \alpha}^{a_t} q = I_G \alpha + m r_G \alpha r_G$$

$$\Rightarrow q = \frac{k_o^2}{r_G} + (\text{radius of gyration})^2 \text{ about } O$$

$$\sum M_O = 0$$