1 page summary of physics engine

jintaeks

position

$$s = vt$$

velocity

$$v = at$$

acceleration

$$a$$

force

$$F = ma$$

momentum

$$p = mv$$

impulse

$$I = Ft$$

rotation

$$\theta = \omega t$$

angular velocity

$$\vec{w} = \vec{v}_\perp / r = (\vec{r} \times \vec{v}) / r^2$$

angular acceleration $\vec{\alpha} = (\vec{r} \times \vec{a}) / r^2$ (see Fig.1)

torque

$$\tau = r \times F = I\alpha$$

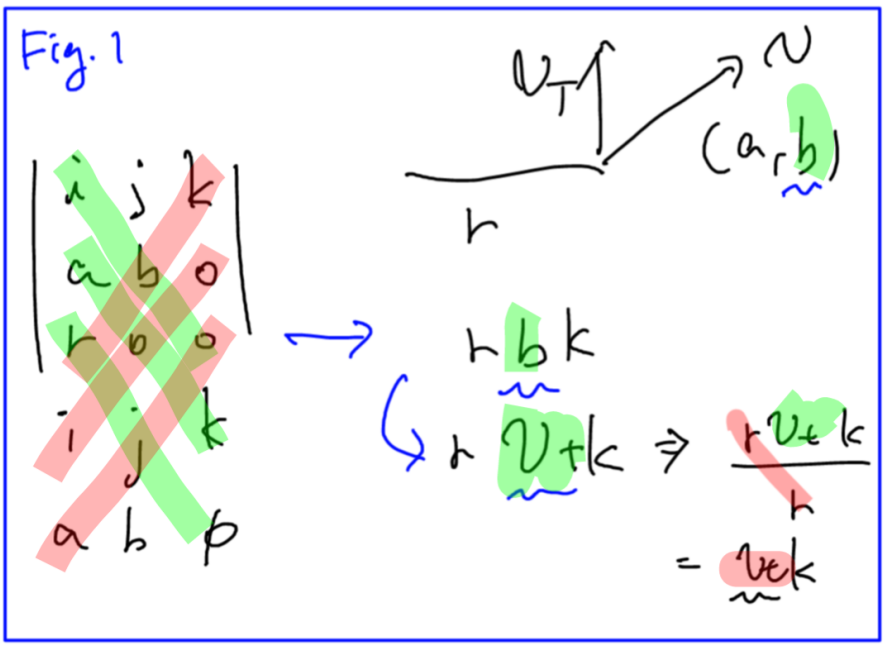
inertia

angular momentum

$$L = r \times p = Iw$$

$$\begin{aligned} \Delta I &= F \Delta t \\ &= ma \Delta t \\ &= m \Delta v \\ &= \Delta p \end{aligned}$$

Fig. 1



$s = vt$ $\qquad$ $\theta = \omega t$

$v = at$ $\qquad$ $\vec{w} = \vec{v}_\perp / r$ (fig 1)

$= (\vec{r} \times \vec{v}) / r^2$

a $\qquad$ $\vec{a} = (\vec{r} \times \vec{a}) / r^2$

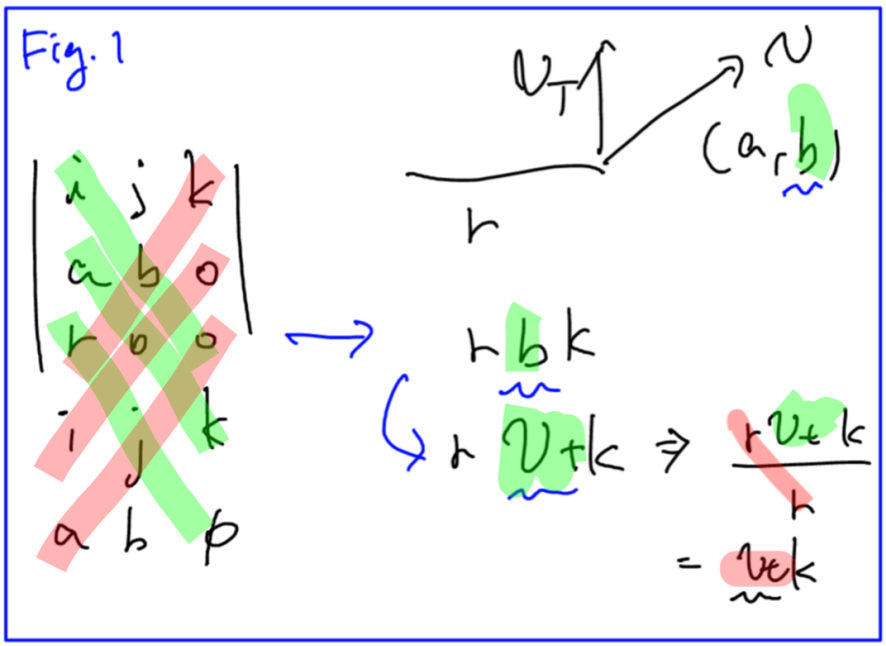
$F = ma$ $\qquad$ $\tau = r \times F = I\alpha$

$p = mv$ $\qquad$ $L = r \times p = Iw$

$I = Ft$

$$\Delta I = F\Delta t = ma\Delta t = m\Delta v = \Delta p$$

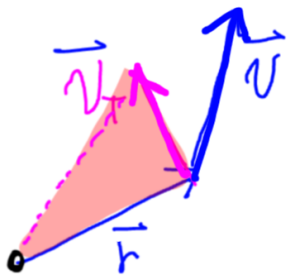
Fig. 1



$S = vt$

$\theta = \omega t$

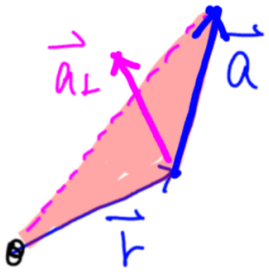
$V = at$



$\vec{w} = \vec{v}_\perp / r$

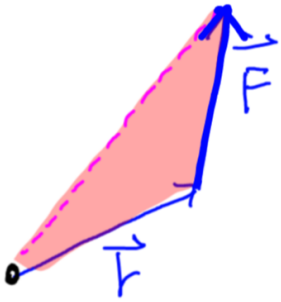
$= (\vec{r} \times \vec{v}) / r^2$ [Fig.1]

a



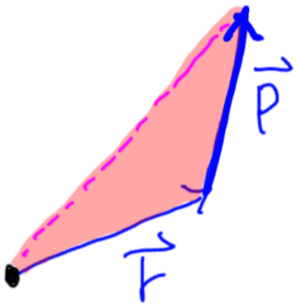
$\vec{\alpha} = (\vec{r} \times \vec{a}) / r^2$

$F = ma$



$\tau = r \times F = I\alpha$

$p = mv$

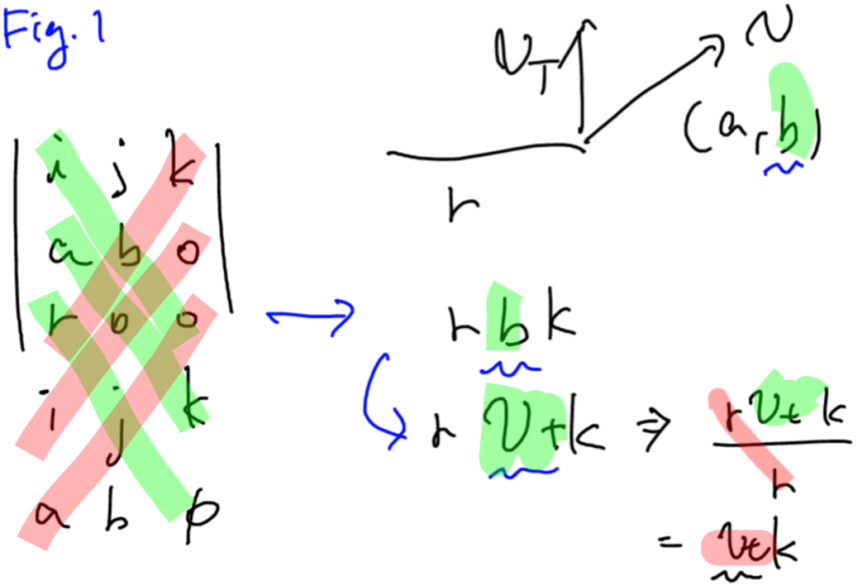


$L = r \times p = I\omega$

$I = Ft$

$$\begin{aligned} \Delta I &= F \Delta t \\ &= ma \Delta t \\ &= m \Delta v \\ &= \Delta p \end{aligned}$$

Fig. 1



$S = vt$

① differentiation ④ integration t

$V = at$

② differentiation ③ integration t

a

③

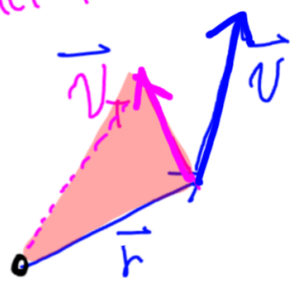
$F = ma$

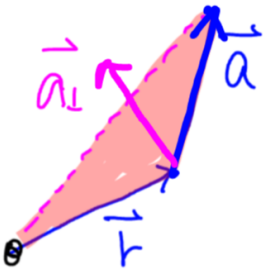
②

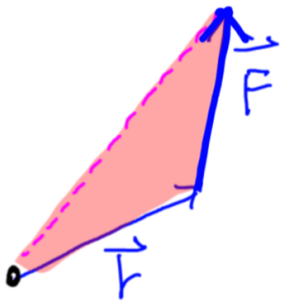
$p = mv$

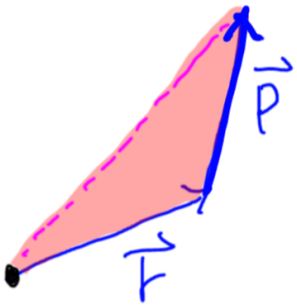
①

$I = Ft$









$\theta = \omega t$

$w = \vec{v}_\perp / r$

$= (\vec{r} \times \vec{v}) / r^2$ [Fig.1]

$\vec{a} = (\vec{r} \times \vec{a}) / r^2$

$\tau = r \times F = I\alpha$

$L = r \times p = Iw$

$\Delta I = F\Delta t$

$= ma\Delta t$

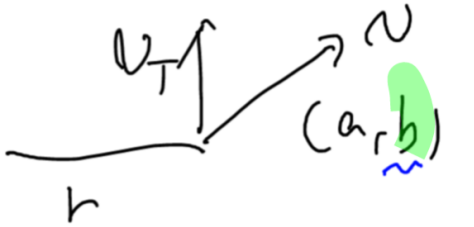
$= m\Delta V$

$= \Delta p$

Fig. 1

$\begin{vmatrix} i & j & k \\ a & b & 0 \\ r & 0 & 0 \end{vmatrix}$

$\begin{vmatrix} i & j & k \\ a & b & p \end{vmatrix}$



$\rightarrow \; r\,b\,k$

$\rightarrow r\,v_T\,k \Rightarrow \dfrac{r\,v_t\,k}{r}$

$= v_t k$

$s = vt$

① differentiation ↓ ④ integration ⑤

$v = at$

② differentiation ↓ ③ integration

a

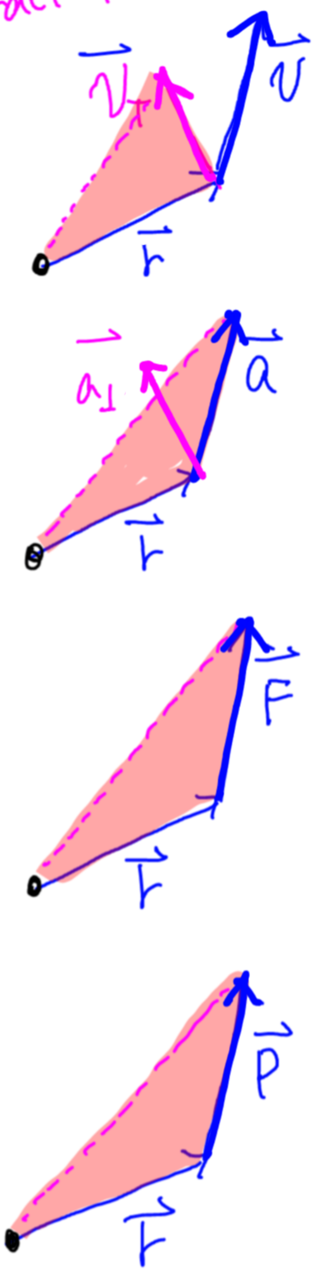
③ ↓ ②

$F = ma$

$p = mv$

①

$I = Ft$



$\theta = \omega t$ ⑤ ④

$\vec{w} = \vec{v}_\perp / r = \vec{r} \times \vec{v}_\perp$

$= (\vec{r} \times \vec{v}) / r^2$ [Fig. 1]

$\vec{\alpha} = (\vec{r} \times \vec{a}) / r^2$

$\tau = \vec{r} \times F = I\alpha$

③

$w = L / I$

②

$L = \vec{r} \times p = Iw$

①

$\Delta I = F\Delta t$

$= ma\Delta t$

$= m\Delta v$

$= \Delta p$

Fig. 1

$v_\perp$, v, (a, b), r

$$\begin{vmatrix} i & j & k \\ a & b & 0 \\ r & 0 & 0 \end{vmatrix} \rightarrow rbk$$

$\rightarrow r v_t k \Rightarrow \frac{r v_t k}{r}$

$= v_t k$