PHY131

momentum $= \vec{p} = m\vec{v}$

Impulse $= J_x = \int_{t_i}^{t_f} F_x(t)\,dt$ = area under the $F_x(t)$ curve between t_i and t_f.

$\Delta p_x = J_x$ (impulse-momentum theorem)

Kinetic energy: K
Potential energy: U

Work:

$W = \int_{s_i}^{s_f} F_s\,ds$

$\vec{A} \cdot \vec{B} = |A||B| \cos\alpha$

$W = \vec{F} \cdot \Delta\vec{r}$

Chapter 12 Rotation of a rigid body

angular velocity

$\omega = \frac{d\theta}{dt}$

angular acceleration

$\alpha = \frac{d\omega}{dt}$

Rotational energy

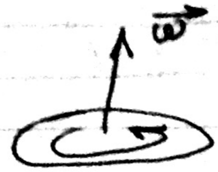
$K_{rot} = \frac{1}{2}(\sum_i m_i r_i^2)\omega^2$

moment of inertia I : $I = m_1 r_1^2 + \cdots + m_n r_n^2 = \sum_i m_i r_i^2$

$K_{rot} = \frac{1}{2} I\omega^2$

Torque

$\tau = rF\sin\phi$



angular velocity

Angular Momentum

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

$= (\vec{r}) \times (m\vec{v})$ (cross product)

$= mvr\sin\alpha$

a net torque causes the particle's angular momentum to change

the rate of change of the system's angular momentum:

$$\frac{d\vec{L}}{dt} = \sum_i \frac{d\vec{L}_i}{dt} = \sum_i \vec{\tau}_i = \vec{\tau}_{net}$$

Angular motion	Linear motion
$K_{rot} = \frac{1}{2} I\omega^2$	$K_{cm} = \frac{1}{2} M v_{cm}^2$
$\vec{L} = I\vec{\omega}$	$\vec{P} = M\vec{v}_{cm}$
$\frac{d\vec{L}}{dt} = \vec{\tau}_{net}$	$\frac{d\vec{P}}{dt} = \vec{F}_{net}$

$\vec{\tau} = I\vec{\omega}$ (rotation about a fixed axle or axis of symmetry)

Chapter 14. Oscillations

$\omega = \sqrt{\frac{k}{m}}$ angular frequency

$T = 2\pi\sqrt{\frac{m}{k}}$

Pendulum: $(F_{net})_t = -\left(\frac{mg}{L}\right)s$

$\omega = \sqrt{\frac{g}{L}}$ $T = 2\pi\sqrt{\frac{g}{L}}$

$f = \frac{1}{T}$

$\omega = 2\pi f = \frac{2\pi}{T}$

$x(t) = A\cos(\omega t + \phi_0) = A\cos\left(\frac{2\pi t}{T} + \phi_0\right)$

$v_x(t) = -V_{max}\sin(\omega t + \phi_0)$

$V_{max} = \omega A$

$a_x(t) = -\omega^2 x(t) = -\omega^2 A\cos(\omega t + \phi_0)$

Ch15. Fluids & Elasticity

$v_1 A_1 = v_2 A_2$

$p + \frac{1}{2}\rho v^2 + \rho g y = \text{constant}$.

Significant figures:

以精度小的为准 (加减乘除运算)

Prof. Vatche Deyirmenjian

non-programmable calculator × 1

考试加油!