

Physics 2130 Exam 2

Outline

Energy

- Conservation of energy
- Two types of energy flow
- Work W
 - Positive and negative work
- Joules
- Kinetic energy E_K
- Potential Energy vs dissipated energy
- Elastic potential energy E_S
- Gravitational potential energy E_G
 - Reference point
 - Only changes in energy are physically relevant
- Power

Momentum & Impulse

- Impulse
- Momentum
- Units of both: Ns
- $\vec{J}_{net} = \Delta p$
-

Systems

- What is a system
- Total momentum of a system
- Center of mass
- $\vec{p}_{tot} = M_{tot}\vec{v}_{com}$
- How to “shift” to the center-of-mass frame and back?

Collisions

- “initial” and “final” in the context of collisions
- During most collisions, only the collision forces matter
- Conservation of Momentum during a collision
- Coefficient of restitution e
- Perfectly elastic collisions
- Maximally inelastic collisions
- Superelastic collisions (e.g. bombs)

Equations

$$E_f = E_i + \Delta E$$

$$W = Fd \cos \theta$$

$$W = \int \vec{F} \cdot d\vec{r}$$

$$E_K = \frac{1}{2}mv^2$$

$$E_S = \frac{1}{2}k(\Delta L)^2$$

$$E_G = mgh$$

$$P = \frac{W}{\Delta t}$$

$$\vec{J} = \int \vec{F} dt = \vec{F}_{avg} \Delta t$$

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

$$\vec{J}_{net} = \Delta p$$

$$\vec{p}_f = \vec{p}_i \text{ (when?)}$$

$$\vec{p}_{tot} = M_{tot}\vec{v}_{com}$$

$$e = \frac{|\vec{v}_1 - \vec{v}_2|}{|\vec{u}_1 - \vec{u}_2|}$$

