Lecture

5/12/05

BASIC EQUATIONS

Newton's Laws

$\vec{F} = m\vec{a}$ $\qquad \vec{\tau} = R \times \vec{F} = I\vec{\alpha}$

Conservation of momentum

Conservation of energy

$E_k = \frac{1}{2}mv^2$ $\qquad E_k = \frac{1}{2}I\omega^2$

$P = \frac{1}{f} = \frac{2\pi}{\omega}$ $\qquad \omega = \sqrt{\frac{k}{m}}$ or $\sqrt{\frac{g}{\ell}}$

$y = A\sin(kx - \omega t)$ $\qquad k = 2\pi/\lambda$

$y = A\sin(kx)\sin(\omega t)$ $\qquad v = f\lambda$

$|\vec{F}| = \frac{k_c q Q}{R^2}$ $\qquad \vec{E} = \frac{\vec{F}}{q}$ $\qquad \Delta V = -\vec{E} \cdot \Delta\vec{r}$

$V = \frac{U}{q}$ $\qquad I = \frac{\Delta q}{\Delta t}$ $\qquad V = IR$ $\qquad P = IV = I^2R$

$R_{eff} = R_A + R_B$ $\qquad \frac{1}{R_{eff}} = \frac{1}{R_A} + \frac{1}{R_B}$ $\qquad Q = CV$

$\tau = RC$

$EA = \frac{Q}{\epsilon_0}$ $\qquad |\vec{B}| = \frac{\mu_0 I}{2\pi r}$

$\vec{F} = q\vec{v} \times \vec{B}$

(OVER)

$$c = \frac{1}{\sqrt{\epsilon_0 \mu_0}} \qquad n_1 \sin\theta_1 = n_2 \sin\theta_2$$

$$\frac{1}{o} + \frac{1}{i} = \frac{1}{f} = \frac{2}{R} \qquad M = \frac{h'}{h}$$

Sign Conventions for Mirrors

Symbol	In Front	In Back	Upright Image	Inverted Image
o	+	−		
i	+	−		
f	+	−		
h'			+	−
M			+	−

Sign Conventions for Lenses

Symbol	In Front	In Back	Convergent	Divergent
o	+	−		
i	−	+		
Lens radii	−	+		
f			+	−

$$\Delta D = n\lambda \qquad \Delta D = \left(n + \frac{1}{2}\right)\lambda$$

$$\Delta t = \frac{\Delta t_p}{\sqrt{1 - \frac{v^2}{c^2}}} = \gamma \Delta t_p \qquad L = L_p \sqrt{1 - \frac{v^2}{c^2}} = \frac{L_p}{\gamma}$$

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}} = \gamma mc^2 \qquad E_R = mc^2$$

$$E = hf = \hbar\omega \qquad KE_{max} = hf - \phi$$

WHAT WORKED FOR YOU IN PHYSICS 122 AND WHAT DIDN'T?

- **General course style and design. Building intuition on basic conceptual tools.**
- **Lectures**
- **Clicker exercises**
- **Interactive lecture demonstrations**
- **Homework**
- **Exams**
- **Laboratories**
- **Tutorials**
- **Individual tutoring (TAs, Slawsky Clinic, instructor)**
- **Textbook**

This is voluntary. You need not cover all points, nor include your name.