

PHYS 1441 – Section 002

Lecture #23

Monday, Dec. 6, 2010

Dr. **Jaehoon Yu**

- Similarities Between Linear and Rotational Quantities
- Conditions for Equilibrium
- How to Solve Equilibrium Problems?
- A Few Examples of Mechanical Equilibrium
- Elastic Properties of Solids
- Density and Specific Gravity



Announcements

- The Final Exam
 - Date and time: 11am – 1:30pm, Monday Dec. 13
 - Place: SH103
 - Comprehensive exam
 - Covers from CH1.1 – what we finish Wednesday, Dec. 8
 - Plus appendices A.1 – A.8
 - Combination of multiple choice and free response problems
 - Bring your Planetarium extra credit sheet to the class next Wednesday, Dec. 8, with your name clearly marked on the sheet!
- Reading assignments
 - Ch9.3 – 9.7



Similarity Between Linear and Rotational Motions

All physical quantities in linear and rotational motions show striking similarity.

Quantities	Linear	Rotational
Mass	Mass M	Moment of Inertia I
Length of motion	Distance L	Angle θ (Radian)
Speed	$v = \frac{Dr}{Dt}$	$w = \frac{Dq}{Dt}$
Acceleration	$a = \frac{Dv}{Dt}$	$\alpha = \frac{Dw}{Dt}$
Force	Force $F = ma$	Torque $\tau = I\alpha$
Work	Work $W = F \cdot d$	Work $W = \tau \theta$
Power	$P = F \cdot v$	$P = \tau \omega$
Momentum	$p = mv$	$L = I\omega$
Kinetic Energy	Kinetic $K = \frac{1}{2}mv^2$	Rotational $K_R = \frac{1}{2}I\omega^2$

