MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Physics Department

Physics 8.01T Fall Term 2004

Experiment 09: Angular Momentum

Section: _____ **Table and Group:** _____

Participants: _____

_____

_____

Each group need turn in only one report. Make sure that you each have a copy of your data, as you will need it for a problem on Problem Set 11. (You can find a copy of the problem at the end of the notes for the experiment.)

Part One: Rotor Moment of Inertia

For your apparatus, what ω (in radians/sec) corresponded to 1 V generator output ?

Enter your measurements for α_{up} and α_{down} into the table below. Following the discussion on page 4, calculate a, T and τ_{up} and enter them into the table.

α_{down}	α_{up}	a	T	τ_{up}

1. In your problem set assignment you will derive this formula for I_R.

$$I_R = \frac{mr(g - r\alpha_{\text{up}})}{\alpha_{\text{up}} + |\alpha_{\text{down}}|}$$

   Use it here to find a numerical value for the rotor moment of inertia.

2. What value do you calculate for the bearing friction τ_f ?

Part Two: Fast Collision
Fill in the table below with the values you found in your experiment.

ω_1	ω_2	δt

The moment of inertia of the washer you dropped to create the collision is given by

$$I_W = \frac{1}{2} M_W (r_o^2 + r_i^2)$$

where $r_o = 0.032\,\text{m}$ and $r_i = 0.0135\,\text{m}$. The mass of the washer, M_W, is written on the washer.

1. What was the mass M_W of your washer ?

2. What was its moment of inertia I_W ?

Part Three: Slow Collision
Fill in the table below with the values you found in your experiment.

ω_1	ω_2	δt	α_c