(Due Friday, Nov. 6)

Problems

Solve the following problems.

- Consider a uniform solid cone of mass *M,* height *h*, and base radius *R.* Choose the *z*-axis along the axis of symmetry of the cone.
  - Determine the moment of inertia tensor around a fixed point at the tip of the cone.
  - Calculate the moment of inertia: (i) around the *z*-axis, (ii) an axis perpendicular to the *z*-axis.
  - For an arbitrary angular velocity $\boldsymbol{\omega}$, find the angular momentum $\boldsymbol{L}$.

- Consider a uniform solid ellipsoid with surface
$$\left(\frac{x}{a}\right)^2+\left(\frac{y}{b}\right)^2+\left(\frac{z}{c}\right)^2=1\,.$$
  - Calculate the moment of inertia for rotation about the *z*-axis.
  - Check your result by comparing with the moment of inertia of a sphere with $a=b=c$.

- (5.15) Consider a flat rigid body in the shape of a 45^o right triangle with uniform mass density.
  - Find the principal moments of inertial about its center of mass.
  - Find the principal axes about the center of mass.