Homework #3 of PH621, Due due on Friday, March 2

1. (20 points) For a homogenous circular cone of height h and base radius R, choose a body-fixed cartesian coordinate system with its origin at the vertex of the cone and one of its axes lying along the axis of the cone (Figure 1). Calculate the inertial tensor of the cone with respect to this body-fixed cartesian coordinate system.

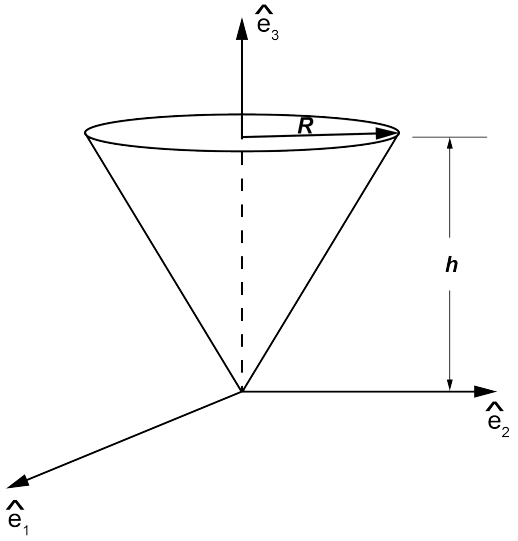

Figure 1

2. Calculate the inertial tensor of a homogeneous cube of density ρ, mass M, and side of length b with respect to two different body-fixed cartesian coordinate systems (Figure 2).

   (a) (20 points) In the body-fixed coordinate system $(\hat{e}_1, \hat{e}_2, \hat{e}_3)$, the origin Q is at the corner and three axes lie along three adjacent edges.

   (b) (20 points) In the body-fixed coordinate system$(\hat{e}'_1, \hat{e}'_2, \hat{e}'_3)$, the origin O is at the center of mass of the cube and its three axes are parallel to those of $(\hat{e}_1, \hat{e}_2, \hat{e}_3)$.

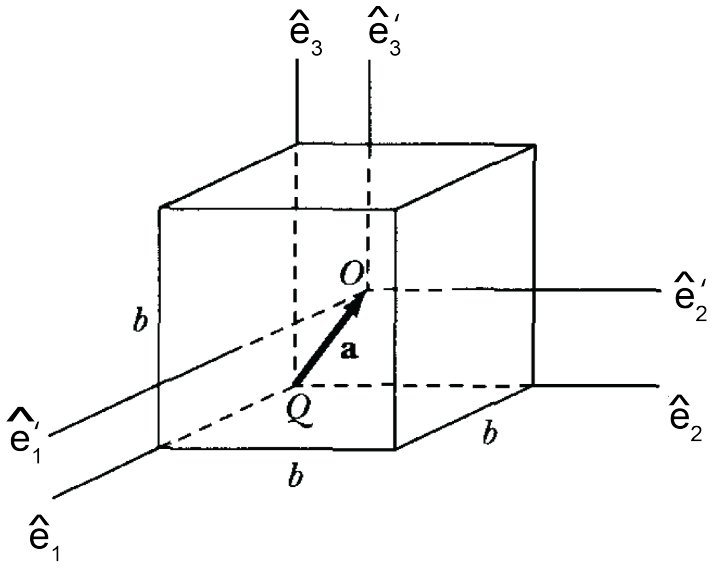

Figure 2