Keystone: Chapter 10

A spherical non-spinning asteroid of mass *M* and radius *R* moving with speed  $v_1$  to the right collides with a similar non-spinning asteroid moving with speed  $v_2$  to the left, and they stick together. The impact parameter (the distance of closest approach of the mass if they didn't collide) is *d*. Note that  $I_{sphere} = (2/5) MR^2$ .

After the collision, what is the velocity  $v_{cm}$  of the center of mass and the angular velocity  $\omega$  about the center of mass? (Note that each asteroid rotates about its own center with the same  $\omega$ .)