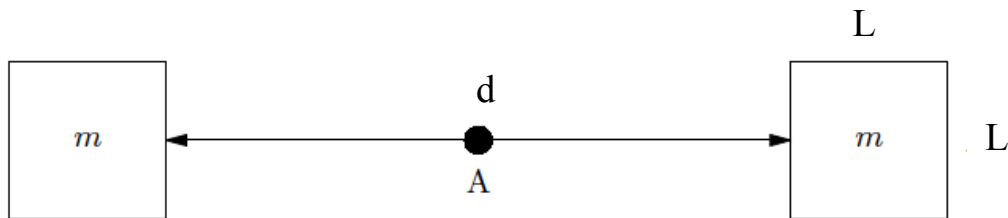


3. Space Panels

A body made of two rigidly linked panels is placed in outer space, where it can spin about 3 different axes. The panels are two thin squares of side L and uniform mass density, each with total mass m . The two panels are coplanar and are connected by a rigid beam (not shown in the figure) of negligible mass and length d (note that d is the edge-to-edge separation of the two panels, not the center-to-center distance).



- (a) Compute the principal moments of inertia $I_1 > I_2 > I_3$ for rotation about the center of mass point A . Indicate the direction of the three principal axes on the diagram
- (b) After its construction, the set of panels was set spinning about the axis with the intermediate moment of inertia I_2 , with its angular velocity chosen so that the pseudo-gravity at the center of each square section is $g/6$. Sadly, a tiny asteroid came by soon after and its impact nudged the angular velocity a little bit away from the I_2 axis. Show that the resulting motion of the panels will be perturbed strongly. What is the characteristic time for the growth of the perturbation?