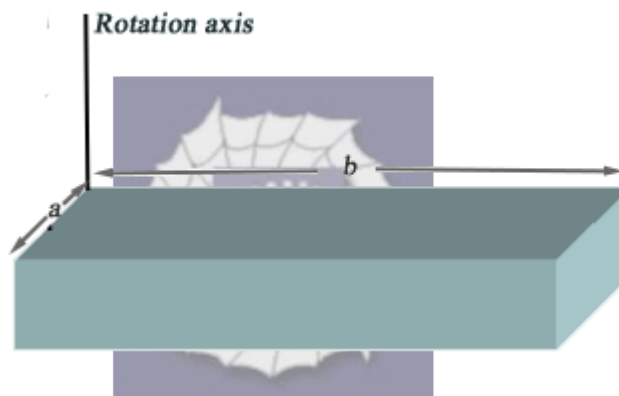


6.

Problem 11.56P (HRW)

A uniform thin solid block of mass M and edge lengths a and b is as shown in the figure. We have to calculate its rotational inertia about an axis through one corner and perpendicular to the large faces.



Solution:

We use the result that the rotational inertia of a thin slab of edges a and b , and mass M about a vertical axis passing through its centre of mass is

$$I_{cm} = \frac{1}{12} \times M (a^2 + b^2).$$

Distance of any of the corners from the centre of mass is

$$\frac{1}{4} (a^2 + b^2).$$

Applying the parallel axis theorem, we get

$$\begin{aligned} I_{corner} &= \frac{1}{12} \times M(a^2 + b^2) + \frac{1}{4} \times M(a^2 + b^2), \\ &= \frac{1}{3} \times M(a^2 + b^2). \end{aligned}$$

