20-R-KIN-DK-4

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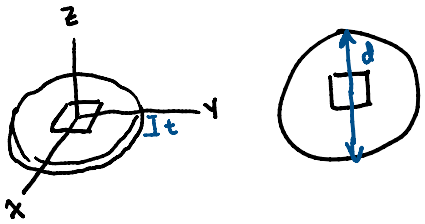
05-26-4 Beginner Composite Bodies Homework



Your friend attempts to do tricks with an Asian coin. He is able to flip it in such a way that it can rotate about its x-axis or spin about its z-axis. What would the moment of inertia be for these two cases? The coin has a thickness of ***t = 2mm*** and a diameter ***d = 30 mm***. The density of the coin is ***rho = 7700 kg/m^3***. The coin has a cutout that is a ***5x5 mm*** rectangular hole.

Disk: $m_D = \rho V_D = 7700\left(\pi(0.03)^2(0.002)\right) = 0.0435425$

Hole: $m_H = \rho V_H = 7700\left(0.005^2(0.002)\right) = 0.000385$

X-axis: $I_{xx} = I_{xxD} - I_{xxH} = \frac{1}{12}(0.0435425)(3(0.03)^2 + 0.002^2) - \frac{1}{12}(0.000385)(0.005^2)$

$= 9.81077 \times 10^{-6}\ kgm^2$

Z-axis: $I_{zz} = I_{zzD} - I_{zzH} = \frac{1}{2}(0.0435425)(0.03^2) - \frac{1}{12}(0.000385)(0.005^2 + 0.005^2)$

$= 0.000019592\ kgm^2$