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PHY422/820: Classical Mechanics

FS 2020

Exam Preparation

December 1, 2020

Problem P13 – Rings

Consider a rigid body consisting of two thin, concentric rings of mass M and radius R . We place the origin of our coordinate system in the center and choose the axes such that the first ring is upright in the xz plane, while the second is tilted by a counter-clockwise rotation by an angle α around the z axis.

1. Construct the moment-of-inertia tensor of the rigid body.
2. Now consider the special case $\alpha = \frac{\pi}{4}$, and compute the principal moments of inertia and principal axes (up to normalization factors).
3. What do you find for $\alpha = \frac{\pi}{2}$?