

PHYS 321 Homework Assignment #9
Due: Friday, 22 November 2002 (4 probs)

1. Problem 7-14, B&O p. 280.
2. Problem 7-17. (Note: the dimensions of the racket are given in Eq. 7.114.)
3. The Earth's axis is tilted, relative to its orbital plane, by an angle of about 23 deg. The Earth can be regarded as an oblate (squashed) sphere, with an equatorial bulge described by the mass-density

$$\rho(r, \theta) = \rho_0 \Theta(R(\theta) - r)$$

where

$$\Theta(x) = \begin{cases} 0, & x < 0 \\ 1, & x > 0 \end{cases}$$

and

$$R(\theta) = R_E [1 - \varepsilon P_2(\cos \theta)]$$

Use the fact that the difference of the moments of inertia $I_z - I_x$ is about 1/300 of their average (b&O p. 259) to estimate the parameter ε . Then calculate the torque on the Earth due to the Sun's gravitational attraction. Finally, estimate the rate of precession of the North Pole. (Precession of the equinoxes.)

4. A uniform wire is stretched between two fixed supports 1 meter apart. If the tension in the wire is 500 Nt and the lineal density is 0.0065 gm/cm, what is the frequency of the lowest resonance?