

B/21

$$\text{Rim: } I = \frac{1}{2} m_2 r_2^2 - \frac{1}{2} m_1 r_1^2 = \frac{1}{2} \rho \pi r_2^4 b - \frac{1}{2} \rho \pi r_1^4 b$$

$$= \frac{1}{2} \rho \pi (r_2^4 - r_1^4) (b)$$

$$= \frac{1}{2} (7830) \pi (0.2^4 - 0.15^4) (0.075)$$

$$= 1.009 \text{ kg} \cdot \text{m}^2$$

$$\text{Hub: } I = \frac{1}{2} \rho \pi (r_2^4 - r_1^4) (b)$$

$$= \frac{1}{2} (7830) \pi (0.05^4 - 0.025^4) (0.12)$$

$$= 0.00865 \text{ kg} \cdot \text{m}^2$$

$$\text{Spokes: } I = 8 \left[\frac{m \ell^2}{12} + m d^2 \right] = 8m \left[\frac{\ell^2}{12} + d^2 \right]$$

$$= 8(7830)(0.1)(200 \times 10^{-6}) \left[\frac{0.1^2}{12} + 0.1^2 \right]$$

$$= 0.01357 \text{ kg} \cdot \text{m}^2$$

$$\text{Total } I = 1.009 + 0.00865 + 0.01357$$

$$= 1.031 \text{ kg} \cdot \text{m}^2$$

$$n = \frac{1.009}{1.031} (100) = \underline{97.8\%}$$