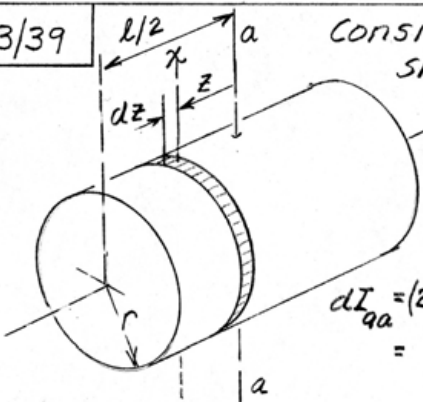


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Consider complete cylindrical shell with mass ρ per unit area

$$dI_{xx} = \frac{1}{2} dm r^2$$

$$dI_{aa} = dI_{xx} + dm (z^2)$$

$$dI_{aa} = (2\pi r \rho dz) \left(\frac{1}{2} r^2 + z^2 \right)$$

$$= \pi \rho r (r^2 + 2z^2) dz$$

$$I_{aa} = \pi \rho r \int_{-l/2}^{l/2} (r^2 + 2z^2) dz = \pi \rho r \left[r^2 z + \frac{2z^3}{3} \right]_{-l/2}^{l/2}$$

$$= 2\pi \rho r l \left(\frac{r^2}{2} + \frac{l^2}{12} \right)$$

For half shell of mass $m = \pi \rho r l$, $\underline{I_{aa} = \frac{m}{2} \left(r^2 + \frac{l^2}{6} \right)}$