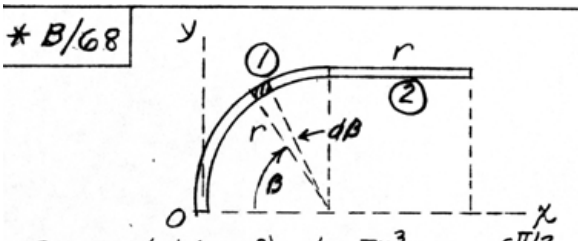
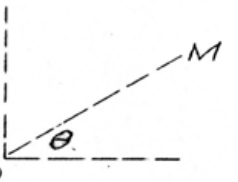
*** B/68**





① $I_x = \frac{1}{4}\frac{1}{2}(4mr^2) = \frac{1}{4}\rho\pi r^3$, $I_y = \int_0^{\pi/2} [r(1-\cos\beta)]^2 \rho r\, d\beta = \rho r^3\left(\frac{3\pi}{4} - 2\right)$

$I_{xy} = \int_0^{\pi/2} r(1-\cos\beta)\, r\sin\beta\, \rho r\, d\beta = \rho r^3\left(-\cos\beta - \frac{1}{2}\sin^2\beta\right)_0^{\pi/2} = \frac{1}{2}\rho r^3$

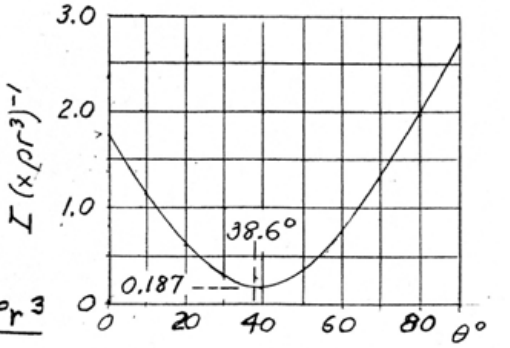
② $I_x = \rho r^3$, $I_y = \rho r\left(\frac{r^2}{12} + \left[\frac{3r}{2}\right]^2\right) = \frac{7}{3}\rho r^3$, $I_{xy} = \rho r\left(\frac{3r}{2}\right) r = \frac{3}{2}\rho r^3$

Totals, $I_x = \rho r^3\left(\frac{\pi}{4} + 1\right) = 1.785\,\rho r^3$, $I_y = \rho r^3\left(\frac{3\pi}{4} - 2 + \frac{7}{3}\right) = 2.69\,\rho r^3$

$I_{xy} = \rho r^3\left(\frac{1}{2} + \frac{3}{2}\right) = 2\rho r^3$

Eq. A/9, $I_{OM} = I = \frac{I_x + I_y}{2} + \frac{I_x - I_y}{2}\cos 2\theta - I_{xy}\sin 2\theta$

Set up computer program & solve for $0 < \theta < 90°$



check: Eqs. A/10 & A/11

$\tan 2\alpha = \frac{2I_{xy}}{I_y - I_x} = \frac{4}{2.69 - 1.785}$

$2\alpha = 77.3°$, $\underline{\alpha = 38.6°}$

$I_{min} = \frac{I_x + I_y}{2} - \frac{1}{2}\sqrt{(I_x - I_y)^2 + 4I_{xy}^2}$

$= (2.24 - 2.05)\rho r^3 = \underline{\mathbf{0.1870}\,\rho r^3}$