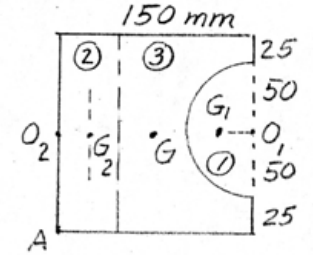
▶B/48 Groove ① $I_{aa} = \bar{I} + m(\bar{G_1A}^2)$

$= I_{O_1O_1} - m(\bar{G_1O_1}^2) + m(\bar{G_1A}^2)$

$= m\left(\frac{1}{2}r^2 - \bar{G_1O_1}^2 + \bar{G_1A}^2\right)$

$= (11\,370)\frac{\pi(0.05)^2(0.15)}{2}\left[\frac{\overline{0.05}^2}{2} - \overline{0.0212}^2 + 0.0222\right]$

$= 0.1541 \text{ kg}\cdot\text{m}^2$ (negative)



$\bar{G_1O_1} = \bar{G_2O_2} = \frac{4(0.05)}{3\pi}$

$= 0.0212$ m

$\bar{G_1A}^2 = (0.15 - 0.0212)^2 + (0.075)^2$

$= 0.0222 \text{ m}^2$

Groove ② $I_{aa} = \frac{1}{2}$ that for complete cyl. by symmetry

So from Table D/4, $I_{aa} = \frac{1}{2}\frac{2m}{12}(3r^2 + 4l^2)$

$= \frac{(11\,370)}{2}\frac{\pi(0.05)^2(0.15)}{12}\left[3(0.05)^2 + 4(0.15)^2\right]$

$= 0.0544 \text{ kg}\cdot\text{m}^2$ (negative)

③ $I_{aa} = \frac{1}{12}m(a^2 + a^2) + m\left(\frac{a^2}{4} + \frac{a^2}{4}\right) = \frac{2}{3}ma^2$

$= \frac{2}{3}(11\,370)(0.15)^3(0.15)^2 = 0.576 \text{ kg}\cdot\text{m}^2$

Total $I_{aa} = 0.576 - 0.0544 - 0.1541 = \underline{0.367 \text{ kg}\cdot\text{m}^2}$

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