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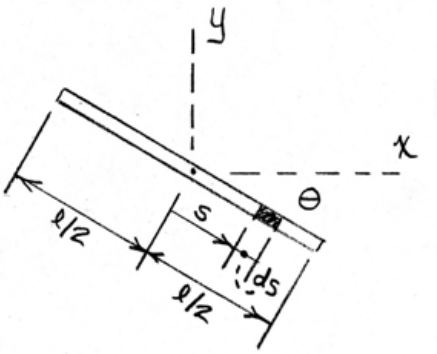

Let ρ = mass/unit length

$dm = \rho\, ds$; $m = \rho \ell$

$dI_{xy} = xy\, dm$

$= (s\cos\theta)(-s\sin\theta)\,\rho\, ds$

$= -\frac{1}{2}\rho \sin 2\theta\, s^2 ds$

$$I_{xy} = -\frac{1}{2}\rho \sin 2\theta \int_{-\ell/2}^{\ell/2} s^2 ds = \underline{-\frac{1}{24} m\ell^2 \sin 2\theta}$$