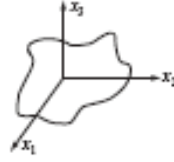


11-17.



The plate is assumed to have negligible thickness and the mass per unit area is ρ_s . Then, the inertia tensor elements are

$$\begin{aligned} I_{11} &= \rho_s \int (r^2 - x_1^2) dx_1 dx_2 \\ &= \rho_s \int (x_2^2 + x_3^2) dx_1 dx_2 = \rho_s \int x_2^2 dx_1 dx_2 \equiv A \end{aligned} \quad (1)$$

$$I_{22} = \rho_s \int (r^2 - x_2^2) dx_1 dx_2 = \rho_s \int x_1^2 dx_1 dx_2 \equiv B \quad (2)$$

$$I_{33} = \rho_s \int (r^2 - x_3^2) dx_1 dx_2 = \rho_s \int (x_1^2 + x_2^2) dx_1 dx_2 \quad (3)$$

Defining A and B as above, I_{33} becomes

$$I_{33} = A + B \quad (4)$$

Also,

$$I_{12} = \rho_s \int (-x_1 x_2) dx_1 dx_2 \equiv -C \quad (5)$$

$$I_{21} = \rho_s \int (-x_2 x_1) dx_1 dx_2 = -C \quad (6)$$

$$I_{13} = \rho_s \int (-x_1 x_3) dx_1 dx_2 = 0 = I_{31} \quad (7)$$

$$I_{23} = \rho_s \int (-x_2 x_3) dx_1 dx_2 = 0 = I_{32} \quad (8)$$

Therefore, the inertia tensor has the form

$$\boxed{\{\mathbf{I}\} = \begin{bmatrix} A & -C & 0 \\ -C & B & 0 \\ 0 & 0 & A+B \end{bmatrix}} \quad (9)$$