



$$\eta_{10} = \int_{\frac{l}{3}}^l (z - \frac{l}{3}) \frac{F}{ES} (-z) dz = -\frac{F}{ES} \left[ -\frac{z^3}{3} + \frac{l}{6} z^2 \right]_{\frac{l}{3}}^l = \frac{Fl^3}{ES} \left( -\frac{1}{3} + \frac{1}{6} + \frac{1}{81} - \frac{1}{54} \right) = \frac{Fl^3 - 54 + 27 + 2 - 3}{ES \cdot 182} = -\frac{14}{81} \frac{Fl^3}{ES}$$

$$\eta_{20} = \int_{\frac{l}{3}}^l (z - \frac{l}{3}) \frac{F}{ES} dz = \frac{F}{ES} \left[ \frac{z^2}{2} - \frac{lz}{3} \right]_{\frac{l}{3}}^l = \frac{Fl^2}{ES} \left( \frac{1}{2} - \frac{1}{3} - \frac{1}{18} + \frac{1}{3} \right) = \frac{Fl^2}{ES} \frac{9 - 6 - 1 + 2}{18} = \frac{Fl^2}{ES} \frac{2}{9}$$

$$\eta_{11} = \int_0^l \frac{z^2}{ES} dz = \frac{l^3}{3ES} \quad \eta_{22} = \int_0^l \frac{1}{ES} dz = \frac{l}{ES}$$

$$\eta_{12} = \int_0^l -\frac{z}{ES} dz = -\frac{l^2}{2ES} = \eta_{21}$$

$$\begin{cases} \frac{l^3}{3ES} X_1 + \frac{l}{ES} X_2 = \frac{14}{81} \frac{Fl^3}{ES} \\ -\frac{l}{ES} X_1 + \frac{l}{ES} X_2 = -\frac{2}{9} \frac{Fl^2}{ES} \end{cases}$$

$$\begin{cases} 54l X_1 - 81 X_2 = 28 Fl \\ -9l X_1 + 18 X_2 = -4 Fl \end{cases}$$

$$\begin{cases} 54l X_1 - 81 X_2 = 28 Fl \\ 27 X_2 = 4 Fl \end{cases}$$

$$X_2 = \frac{4}{27} Fl \quad 54l X_1 - 81 \cdot \frac{4}{27} Fl = 28 Fl$$

$$X_1 = \frac{40}{54} F = \frac{20}{27} F$$

