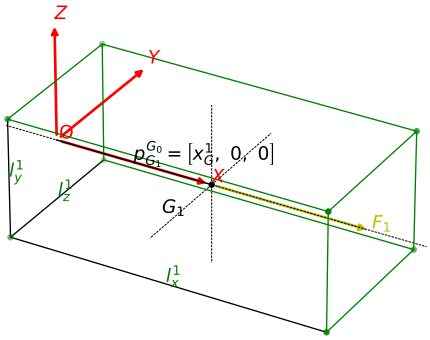

Coordinates

$$q_1 = \left(\mathrm{x}_{\mathrm{G}}^{1}\right) \tag{1}$$

Configuration

$$\Pi_0 = \left(\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \right) \tag{2}$$

$$\Pi_1 = \left(\begin{bmatrix} \mathrm{x}_{\mathrm{G}}^{1} \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \right) \tag{3}$$

Energy

$$L = \frac{1}{2} m_1 \left(\frac{d}{dt} \mathrm{x}_{\mathrm{G}}^{1} \right)^2 \tag{4}$$

Kinetic Energy Metric

$$G = \begin{bmatrix} m_1 \end{bmatrix} \tag{5}$$

Forces and Torques

$$F_1 = \left(\begin{bmatrix} F_x^1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \mathrm{x}_\mathrm{G}^1 \\ 0 \\ 0 \end{bmatrix} \right) \tag{6}$$

Equations of Motion

$$\begin{bmatrix} I & 0 \\ 0 & G \end{bmatrix} \begin{bmatrix} \frac{d}{dt}\,\mathrm{x}_\mathrm{G}^1 \\ \frac{d^2}{dt^2}\,\mathrm{x}_\mathrm{G}^1 \end{bmatrix} = \begin{bmatrix} \frac{d}{dt}\,\mathrm{x}_\mathrm{G}^1 \\ F_x^1 \end{bmatrix} \tag{7}$$