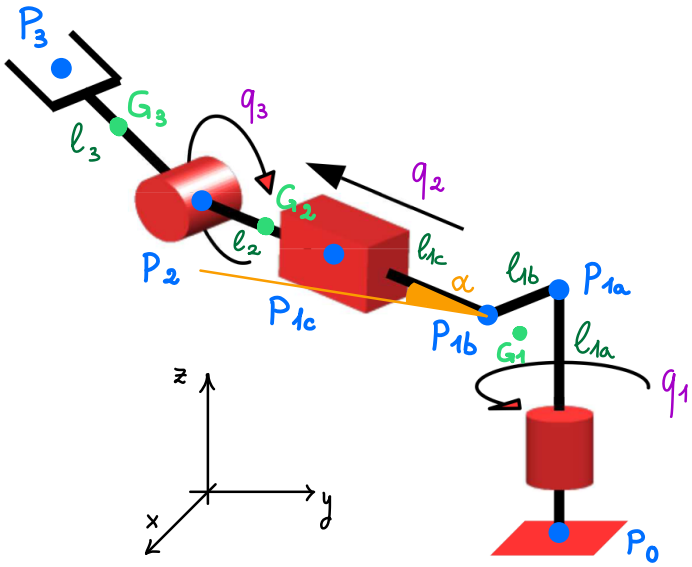
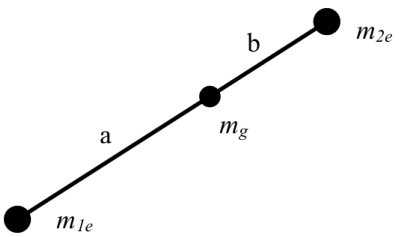


Extended coordinates:

- x_{end3}, y_{end3}, z_{end3}
- x_{g3}, y_{g3}, z_{g3}
- x_{end2}, y_{end2}, z_{end2}
- x_{g2}, y_{g2}, z_{g2}
- x_{end1}, y_{end1}, z_{end1}
- x_{g1}, y_{g1}, z_{g1}
- x_{end0}, y_{end0}, z_{end0}
- q_1, q_3

$$\begin{cases} m_3 = m_{1e} + m_g + m_{2e} & mass \\ m_{1e}a = m_{2e}b & center\ of\ mass \\ J_{g3} = m_{1e}a^2 + m_{2e}b^2 & inertia\ moment \end{cases}$$



$$\begin{cases} m_{1e} = \frac{J_{g3}}{a(a+b)} \\ m_g = m_3 - \frac{J_{g3}}{ab} \\ m_{2e} = \frac{J_{g3}}{b(a+b)} \end{cases}$$

5 - mass approximation LINK 1

$$\begin{cases} m_1 = m_{1prox} + m_{1a} + m_g + m_{1b} + m_{1dist} \\ \dfrac{m_{1prox} P_0 + m_{1a} P_a + m_g P_g + m_{1b} P_{1b} + m_{1dist} P_{1c}}{m_1} = G_1 \\ J_{1,zz} = m_{1prox} d_0^2 + m_{1a} d_{1a}^2 + m_g P_g^2 + m_{1b} d_{1b}^2 + m_{1dist} d_{1c}^2 \end{cases}$$

5 equations, 5 unknowns