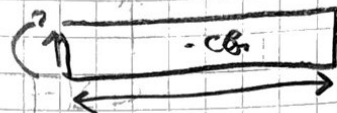


FBD



$$M\ddot{X} + B\dot{X} + CX = 0$$

$$\ddot{X}_1 = 1, \quad \ddot{X}_2 = 0$$

$$\Sigma F \Rightarrow F'' + m\ddot{X}_1 = 0 \Rightarrow F'' = -m$$

$$\Sigma M_{CG} = I\ddot{X}_2 + F'' \cdot \frac{L}{2} = 0$$

$$F'' = -\frac{mL}{2}$$

$$\ddot{X}_1 = 0, \quad \ddot{X}_2 = 1$$

$$\Sigma M_{CG} = F'' \cdot \frac{L}{2} + \left(I\ddot{X}_2 + \left(\frac{L}{2} \right)^2 m \right) = 0$$

$$F'' = -\frac{4I - mL^2}{4}$$

$$M = I\ddot{u}$$

$$\Sigma F = F'' + m \frac{L}{2} \ddot{X}_2 = 0$$

$$F'' = -m \frac{L}{2}$$

$$A = \begin{bmatrix} a^{11} & a^{12} \\ a^{21} & a^{22} \end{bmatrix}$$

$$\vec{M} = \begin{bmatrix} -m & -\frac{mL}{2} \\ -m\frac{L}{2} & -\frac{4I - mL^2}{4} \end{bmatrix}$$

$$(M+A)\ddot{X} = -CX$$

$$\ddot{X} = (M+A)^{-1}(-CX)$$

$$C = \begin{bmatrix} c_{33} & c_{33} \\ c_{33} & c_{33} \end{bmatrix}$$