10/10

Results of project 2 – part 1

ROZET François

Choices of degrees of freedom :

1. The vertical variation in position y of the system's (beam and cylinder) mass center respectively to the balance position.
2. The tilt θ of the system respectively to the horizontal.

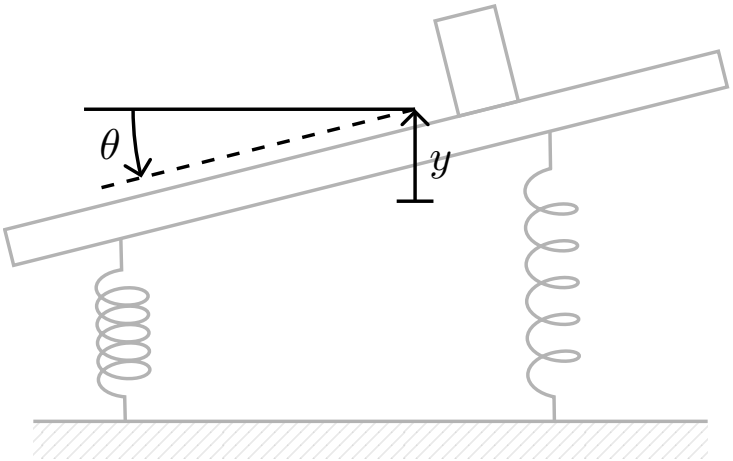

Figure 1 – Degrees of freedom of the system.

$$\underline{\underline{\boldsymbol{K}}} = \begin{bmatrix} 21\,000\ \mathrm{N/m} & -2037\ \mathrm{N} \\ -2037\ \mathrm{N} & 4450\ \mathrm{N \cdot m} \end{bmatrix} \qquad \underline{\underline{\boldsymbol{M}}} = \begin{bmatrix} 6.38\ \mathrm{kg} & 0\ \mathrm{kg \cdot m} \\ 0\ \mathrm{kg \cdot m} & 0.7784\ \mathrm{kg \cdot m^2} \end{bmatrix}$$

$$\omega_1 = 8.6962\ \mathrm{Hz} \qquad \underline{\boldsymbol{x}}_1 = \begin{bmatrix} 1\ \mathrm{m} \\ 0.9583\ \mathrm{rad} \end{bmatrix}$$

$$\omega_2 = 12.3514\ \mathrm{Hz} \qquad \underline{\boldsymbol{x}}_2 = \begin{bmatrix} -0.1169\ \mathrm{m} \\ 1\ \mathrm{rad} \end{bmatrix}$$

Coordinates of the vibration node for the mode $\underline{\boldsymbol{x}}_2$:

$$0.1639\ \mathrm{m}$$