

# Results of project 2 – part 1

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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  $\theta$  of the system respectively to the horizontal.

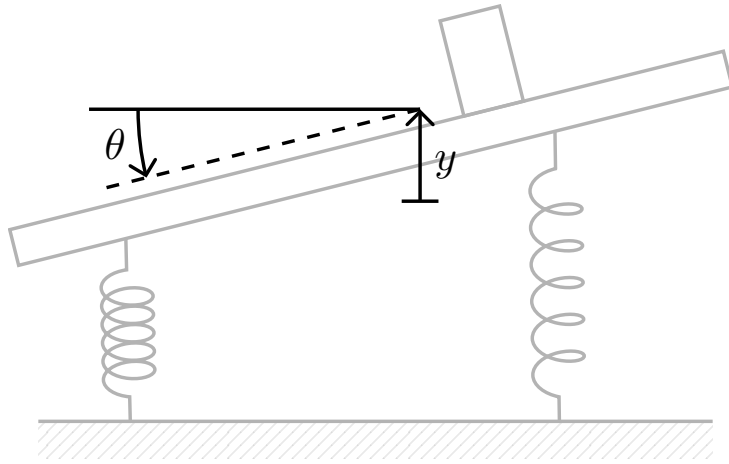


Figure 1 – Degrees of freedom of the system.

$$\underline{\underline{K}} = \begin{bmatrix} 21\,000 \text{ N/m} & -2037 \text{ N} \\ -2037 \text{ N} & 4450 \text{ N} \cdot \text{m} \end{bmatrix}$$

$$\underline{\underline{M}} = \begin{bmatrix} 6.38 \text{ kg} & 0 \text{ kg} \cdot \text{m} \\ 0 \text{ kg} \cdot \text{m} & 0.7784 \text{ kg} \cdot \text{m}^2 \end{bmatrix}$$

$$\omega_1 = 8.6962 \text{ Hz}$$

$$\underline{\underline{x}}_1 = \begin{bmatrix} 1 \text{ m} \\ 0.9583 \text{ rad} \end{bmatrix}$$

$$\omega_2 = 12.3514 \text{ Hz}$$

$$\underline{\underline{x}}_2 = \begin{bmatrix} -0.1169 \text{ m} \\ 1 \text{ rad} \end{bmatrix}$$

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

$$0.1639 \text{ m}$$