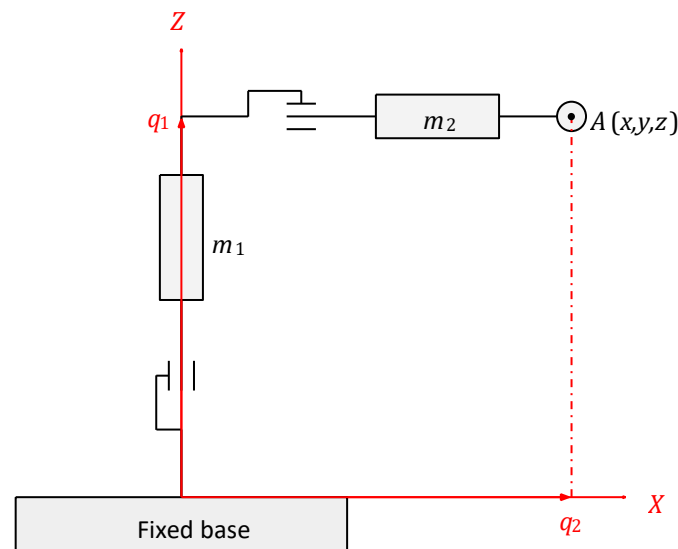


Exercise set 7 - Dynamics

Exercise 1

The goal of this exercise is to determine the dynamic model of the Cartesian robot with two axes through the Lagrange approach.

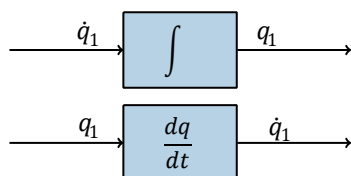


Operational coordinates (tool): $\begin{pmatrix} x \\ y \\ z \end{pmatrix}$

Joint coordinates: $\begin{pmatrix} q_1 \\ q_2 \end{pmatrix}$

1. Determine the IDM of this Cartesian robot using the Lagrange approach.
2. From the developed model, make conclusions about the inertia (whether the inertia is constant in space), about the coupling of the axes (whether the axes are coupled or decoupled) and about the positional dependence of the controllers (whether the controllers will depend on the configuration/position of the robot).
3. Give the expression of the a priori IDM (function of required torque/forces for a desired trajectory).
4. Determine the DDM.
5. Draw the block representation of the DDM.

Hint: Example of blocks would be like this:



Exercise 2

Determine the inverse dynamic model of the two-axis Cartesian robot using the Newton-Euler approach.