EasyDyn problem : Sliding Pendulum

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1 Description of the system

The considered system is represented in figure 1. It consists of a body S_0 in translation with respect to x axis. The second body, S_1, is a pendulum attached to the previous body by a revolute joint of horizontal axis (z axis).

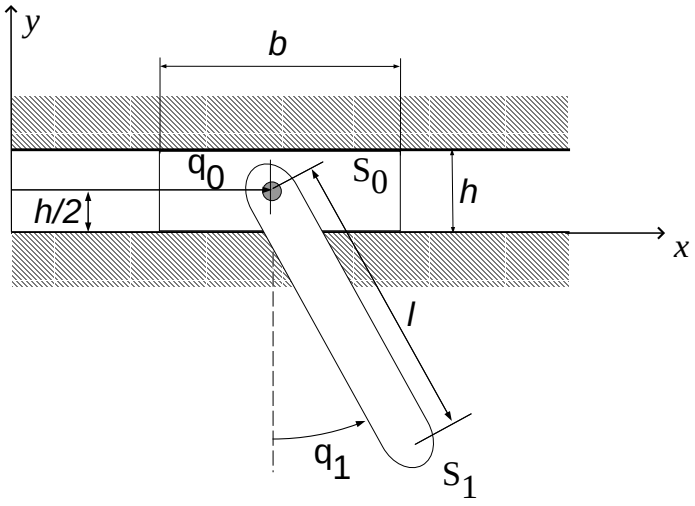

FIG. 1 – Sliding pendulum ($b = 1.5\,m$, $h = 0.5\,m$, $l = 2\,m$, $m_0 = 5\,kg$, $m_1 = 2\,kg$)

2 Requested results

It is asked to simulate the behaviour of the system, subjected to gravity, with the initial condition $q_1 = \pi/2$.

The problem will be solved in two manners

1. by expressing the kinematics from the classical laws of mechanics, with the help of the vector operators implemented in `EasyDyn`;
2. with the help of the `CAGeM` utility.

The simulation will be performed from 0 to $5\,s$.

3 Typical results

Figures 2 to 4 give the expected evolutions of the configuration parameters and their time derivatives.

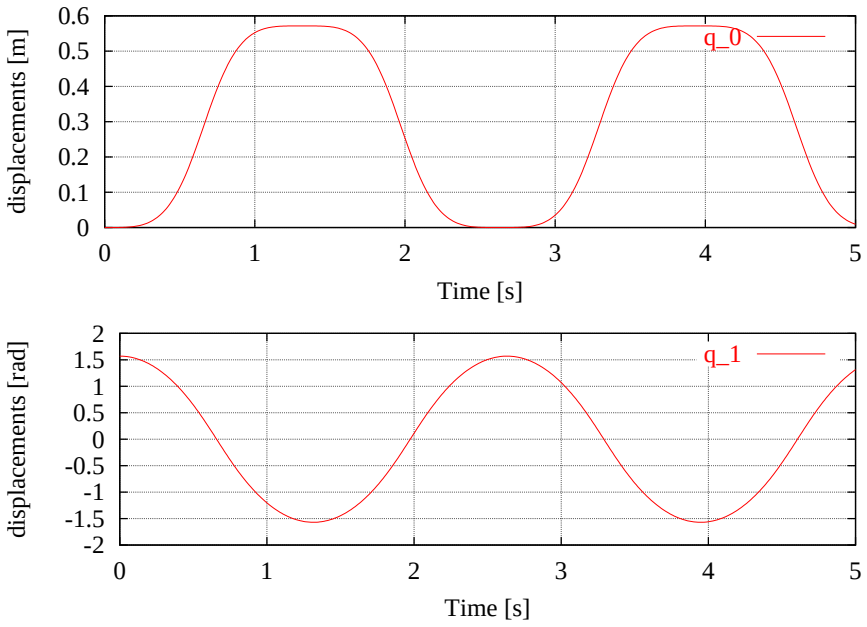

FIG. 2 – Evolution of configuration parameters

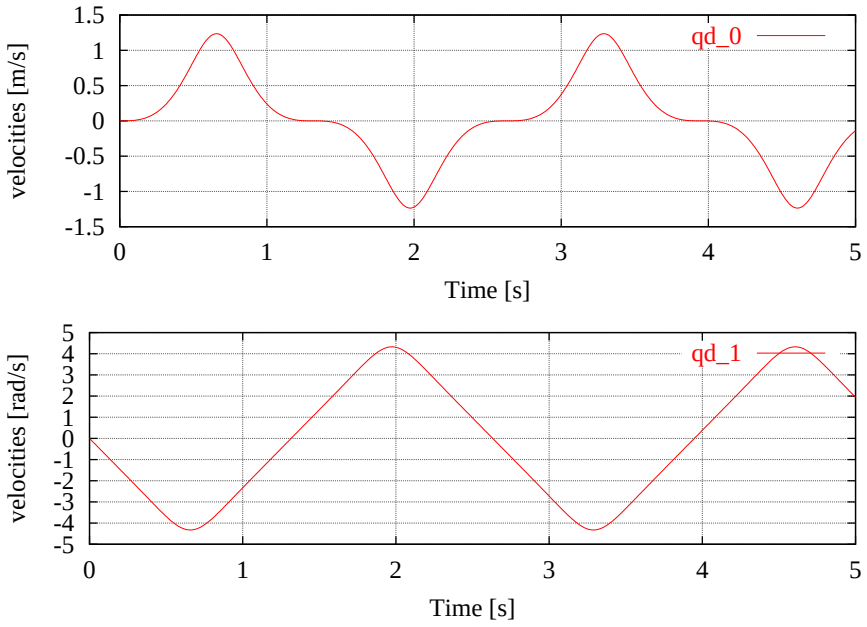

FIG. 3 – Evolution of first time derivatives of configuration parameters

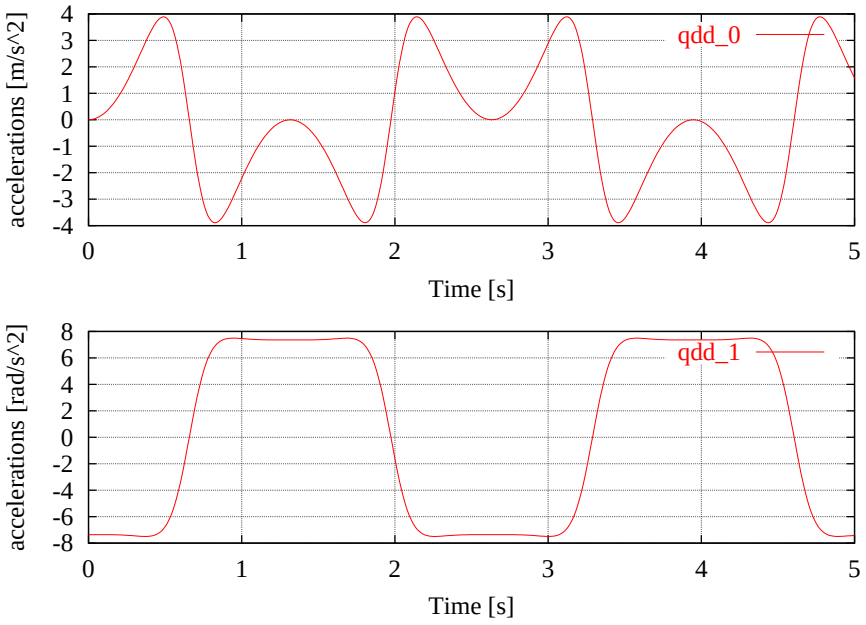

FIG. 4 – Evolution of second time derivatives of configuration parameters