EasyDyn problem: cart on a circular path

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1 Description of the system

The considered system is represented in figure 1 and consists of a cart equipped with 2 wheels rolling without sliding on a circular path. The system owns only one degree of freedom corresponding to the angle of segments OG with respect to the vertical. The dimensional and inertial parameters are given on the figure.
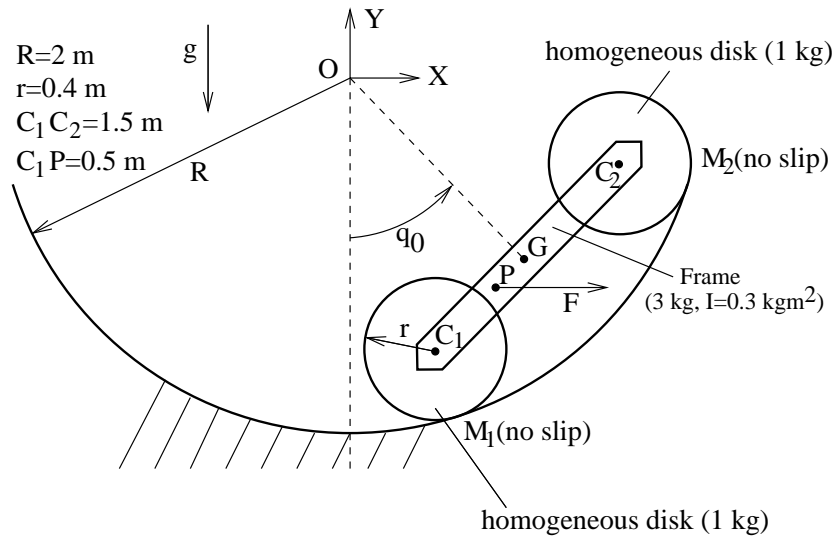

Figure 1: Cart on a circular path

2 Requested results

Assuming firstly that the horizontal force on point P is equal to zero, it is asked to determine the time needed by the cart to reach the position $q_0 = 0$, from initial conditions q_0=1 rad and $\dot{q}_0$=0 rad/s.

In a second analysis, determine the position of static equilibrium when the horizontal force on point P is worth 10 N.

3 Typical results

The results in figures 2 to 3 correspond to the first case. For the second analysis, the equilibrium configuration corresponds to q_0=0.2084 rad.
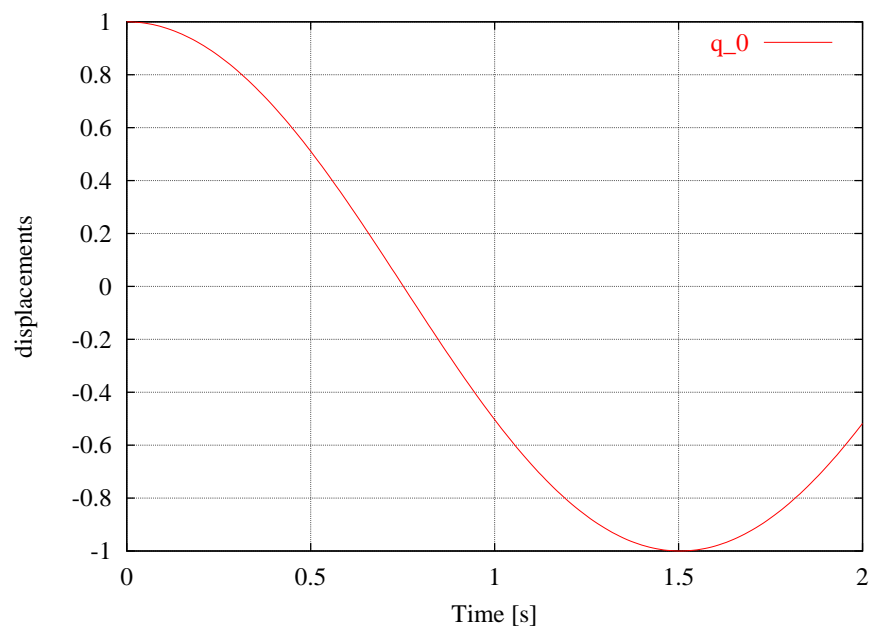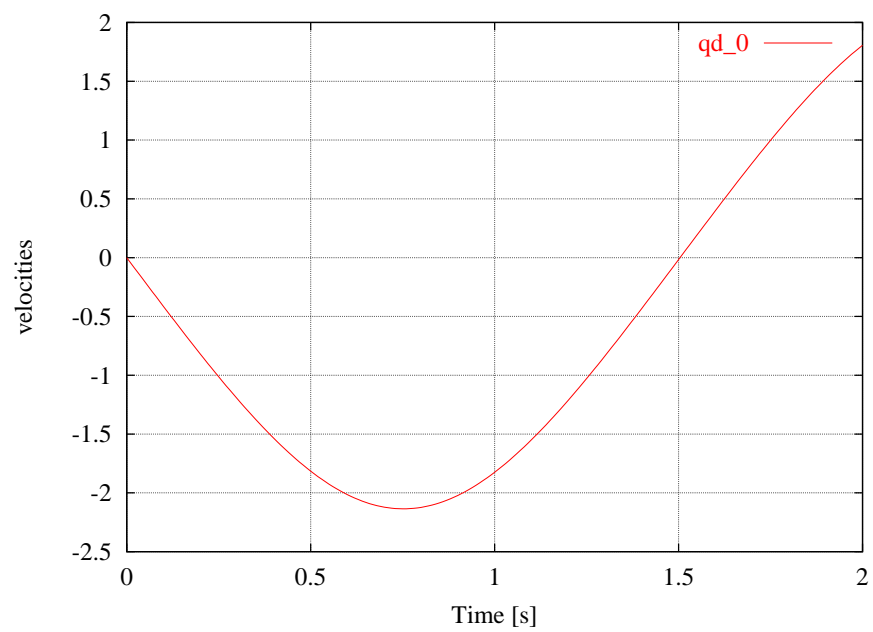
Figure 2: Time evolution of parameters

Figure 3: Time evolution of time derivatives of parameters