LIÈGE université

Academic year 2018-2019

Dynamics of Mechanical Systems

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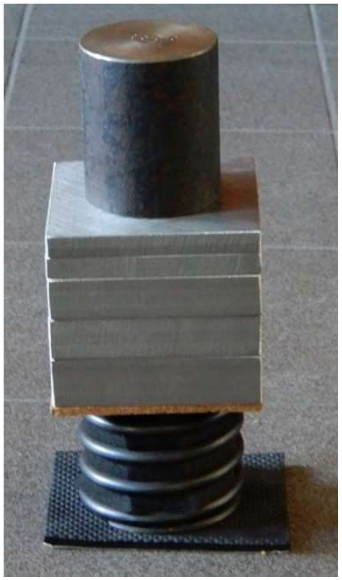
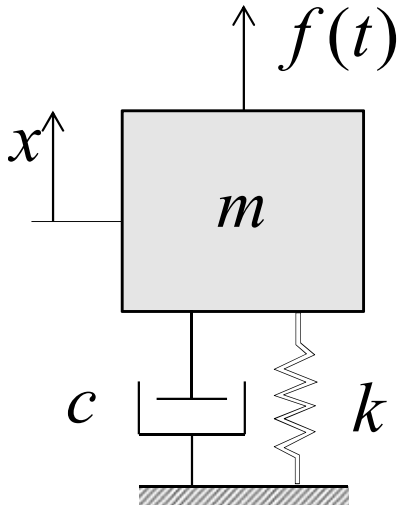
Assignement of Project n° 1

Description of the set-up

The system consists of a mass m supported by a spring of stiffness k as illustrated in Figure 1.





Data

$m = 4{,}484\ kg$

$k = 10\ 500\ N/m$

Figure 1.- The 1DOF system

Project assignment

1. Compute the natural frequency of the system.
2. The time response of the system is measured using an impact excitation. The experimental data are available on MyULg website in the file 'IRF_1DOF.txt' in which two columns of data are given:

Time (s)	Acceleration (g)
⋮	⋮

3. Plot the time response and evaluate the corresponding experimental natural frequency. Evaluate the associated damping ratio using the logarithmic decrement method.

Note: in Matlab, the data can be loaded by the command v=load('IRF_1DOF.txt') where v is a vector of two columns.

Project statement

4. The corresponding frequency response function (FRF) is given in the file 'FRF_1DOF.txt' in which three columns of data are present:

Frequency Hz	Re(FRF) g/N	Im(FRF) g/N
⋮	⋮	⋮

5. Plot the Bode diagram and evaluate the quality factor and the damping ratio using the half-power method.
6. Plot the Nyquist diagram and evaluate the damping ratio.
7. Compare the results obtained for the damping ratio.

Note: use the original data to make the graphs. Do not normalize them!

Submission of the report

A PDF version of the report will be sent by e-mail at the following address: JC.Golinval@uliege.be and will be named as follows:

DSM1_LAST NAME_first name.pdf

The deadline for the submission of the report (maximum 5 pages including figures) is fixed to

November 8, 2018 at 3 pm.