Worksheet for Bode Plots and System Identification

Andreas Stahel, Pierre-André Chevalier, Phoebe Hoidn

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The files for this lab session are on the home page `staff.ti.bfh.ch/sha1`. Use the link `Octave Information` on the left, then find files for the local *Octave*/`MATLAB` sessions at the bottom of the page. Use the information in the subdirectory `F2/Bode`. The necessary information and documentation is given in the paper **Bode Plots and System Identification** .

Plots

The main goal is to generate the desired plots listed in Section 3. Use the presented examples in Section 2 as helping guide.

1 Read and understand Section 1 ☐
2 Work carefully through the graphics commands in Section 2. You should learn to generate linear plot, and plots with logarithmic scales. ☐
3 Read and understand the first part of Section 3, it explains the data contained in file `Transfer1.txt`. Then start *Octave* or `MATLAB`. ☐
4 Use the code in Section 3.1 to read the data into `MATLAB` or *Octave*. ☐
5 Generate the plot of the amplitude as function of the frequency. Use the results from Section 2 ☐
6 Generate the plot of the phase as function of the frequency. Use the results from Section 2 ☐
7 Generate the Bode plot for the amplitudes. Use the results from Section 2 ☐

System Identification

In this section the method to identify the system are explained step by step. You are expected to carry out those steps.

1 Read the first part of Section 4 to understand why a quadratic function should appear. ☐
2 Verify that the system parameters U, α and ω_0 are determined, once the coefficients a_0, a_1 and a_2 of the parabola are known. ☐
3 Verify with the help of a graph that the parabola shows up. ☐
4 Construct the matrix $\mathbf{F}$ for the linear regression in *Octave* or `MATLAB`. ☐
5 Apply the command `LinearRegression()` and verify graphically that the results are correct. ☐
6 Use the numerical values of a_i to determine ω_0 and α. Then determine the ratios of $\frac{\gamma}{m}$ and $\frac{k}{m}$ for the spring mass system in the introduction. ☐