**Position Bandwidth**

The goal of this test is to determine the position bandwidth of a certain controller. The bandwidth is defined as the frequency, with which the end-effector cannot follow a sine curve anymore. It is reached when the magnitude of the transfer-function (with P as position) falls beneath -3dB.

**How to do the measurement:**

1. Run “6\_position\_bandwidth\_main.vi”
2. Choose the correct mike version in the block diagram
3. Enter the amplitude of your sine wave (I did 5°)
4. Enter the Sine Frequency
5. Enter the number of cycles
6. Test if it runs stably by pressing "run"
7. If it is stable: enter a **non-existent** tdms file name according to this naming scheme: mike**X**\_PB\_**f;** for example, *mike3\_PB\_0.1* or *mike6\_PB\_20*
8. Press "save data"
9. Press "run"
10. After the profile was run, press "save data" to stop the recording
11. For high frequencies the end-effector will probably not stop at 0°, so you should move it back to around 0° by hand.
12. Repeat steps 4-11 for all frequencies you want to measure

**How to do the analysis**

The data analysis consists of three different files: Bode\_Plot.py, mag\_phase\_extractor.py (function) and mag\_phase\_extractor.py (stand-alone). If everything works fine and you named your tdms files correctly, then you only have to worry about Bode\_Plot.py. This one generated the bode plot and uses the extractor function to read the magnitude and the phase from all tdms files.

In case you run into any issues with the extractor function, you can use the standalone extractor for debugging. There you can also visualize your data in a plot and try to find the source of your error, which can happen as explained in the characterisation report.

**Bode Plot:**

1. Ein Bild, das Text enthält.

   Automatisch generierte BeschreibungAdjust the mike version as well as the frequencies you have measurements for in this part:
2. In the generated plot: read where the horizontal line (-3dB) crosses the magnitude-line (at which frequency) 🡪 adjust the vertical line to be plotted at this x-value:
3. Also adjust the name under which the plot is saved

**mag\_and\_phase (standalone – only use for debugging)**

1. Adjust the tdms file name:
2. Here you can adjust the filtering of the measured position signal: Ein Bild, das Text enthält.

   Automatisch generierte Beschreibung
3. After the plotting, you'll find all the "special cases" described in the characterisation report. There you can also print the different peak-measurements and their timepoints to find the souce of your error. (Most probably there is a misfit in sizes between peaks in the measured signal and peaks in the setpoint signal)
4. After you found the problem and a working solution 🡪 implement the solution also in the extractor function which is imported when running Bode\_Plot.py

For me the current extractor function worked for both my measurements for MIKE #3 and MIKE #6, but it is possible that it won't work for future measurements.