**KB-Plot**

The goal of this test is to evaluate the ability of the system of rendering virtual dynamics. In this case a virtual wall is rendered, and the maximum KB-pairs are determined.

**How to do the measurement:**

1. Run “5\_kb\_plot\_main.vi”
2. For the KB-plot part no data has to be recorded
3. Enter the torque constant (Mike 6: 0.0302 Nm/A; Mike 1-5 & 7: 0.137 Nm/A)
4. Enter the position of the wall (**Attention!** The wall will be on the right side of this position and the end-effector will be pushed to the left 🡪 make sure that the end-effector is on the left side of your wall when you start the rendering
5. Choose a velocity estimation method (I did the measurements for all three)
6. Start the rendering by pressing “*start rendering”*
7. Enter a value for B (I started with 0)
8. Enter a value for K (I started with 0.1)
9. Move the end-effector into the wall (by hand) and move it around this position
10. When no instability is found 🡪 increase the K-value until an instability is found
11. Write down the maximum K you found for a corresponding B value in a separate excel sheet (see “*5\_KB\_example”*)
12. Increase the B value (steps of 0.0001 is a good starting point but you will have to get a feeling for yourself)
13. Repeat steps 8-11 for your new B-value
14. Repeat steps 7-12 until you cannot find a stable K-value for a B-value 🡪 this is the end of your story

**How to do the analysis**

1. This one is very straight-forward 🡪 you just have to set the path for your excel file correctly and in the plotting section you can adjust the plot. It is **important** that you adjust the name under which the plot is saved

**Virtual Wall Rendering**

In this test we want to evaluate the rendering of the wall with the maximum KB-pair found in the KB-plot test. For that we measure the force while pushing the end-effector into the wall.

**How to do the measurement:**

1. Run “5\_kb\_plot\_main.vi”
2. Enter values for wall position, torque constant, K, B and the velocity method (take the maximum values you found in the previous test)
3. Enter a **non-existent** tdms filename
4. Press *"save data"*
5. Press *"start rendering"*
6. Move the end\_effector into the wall, as soon as you feel that the force does not increase further 🡪 Press *"save data"* to stop the data recording
7. Stop the program

**How to do the analysis**

1. Enter the tdms file path
2. Set the wall position (so in the plot it will be at 0°)
3. Adjust the plot as you wish:
   1. Adjust the title
   2. Adjust the name as which it is saved
   3. Adjust other properties like the x-axis limits