

I have included a few of the basic commands you need to start getting around in Matlab's *sisotool*. As you explore I'm sure you'll find more efficient ways to do these things.

Getting Started

- Enter $G(s)$ in your workspace.
- Type **sisotool** in the command window
- Click **close** when the help window comes up
- Click on **view** → **open loop bode** to turn off the bode plot. (whatever is checked will be shown, we only want to see the root locus).

Loading the transfer function

- Click on **file** → **import**
- A window on the left will show you the transfer functions in your workspace, while the window in the right will let you choose the control system configuration.
- We will usually be assigning $G(s)$ to block G (the plant), so type your transfer function name next to G and then **enter**. You must hit enter or nothing will happen.
- Once you hit enter, you should be able to click on the **OK** at the bottom of the window. The window will then vanish.
- Once the transfer function has been entered, the root locus is displayed. Make sure the poles and zeros of your plant are where you think they should be.

Generating the step response

- Click on **Analysis** → **Response to Step Command**
- You will probably have two curves on your step response plot. To just get the output, type **Analysis** → **Other Loop Responses**. Make sure only r to y is checked, and then click **OK**.
- You can move the location of the pole in the root locus plot and see how the step response changes.

- The bottom of the root locus window will show you the closed loop poles corresponding to the cursor location. However, if you need all of the closed loop poles you have to look at all of the branches.

Entering a Compensator (Controller)

- Type **Compensators** → **Edit** → **C**
- Click on **Add Real Zero** or **Add Real Pole** to enter poles and zeros. You will be able to change these values very easily later.
- Click **OK** to exit this window.
- Look at the form of C to be sure it's what you intended, and then look at the root locus with the compensator.
- You can again see how the step response changes with the compensator by moving the locations of the poles (grab the pink dot and slide it).
- You can also change the location of the pole and zeros of the compensator by grabbing them and sliding them. Be careful not to change the poles and zeros of the plant though!

Adding Constraints

- Click **Edit** → **Root Locus** → **Design Constraints** then either **New** to add new constraints, or **Edit** to edit existing constraints.
- At this point you have a choice of various types of constraints.

Odds and Ends

- You may want to fix the axes. To do this,
 - Click **Edit** → **Root Locus** → **Properties**
 - Click on **Limits**
 - Set the limits
- You may also want to put on a grid, as another method of checking your answers. Type **Edit** → **Root Locus** → **Grid**
- It is easiest if you use the zero/pole/gain format for the compensators. To do this click on **Edit** → **SISO Tool Preferences** → **Options** and click on **zero/pole/gain**.