

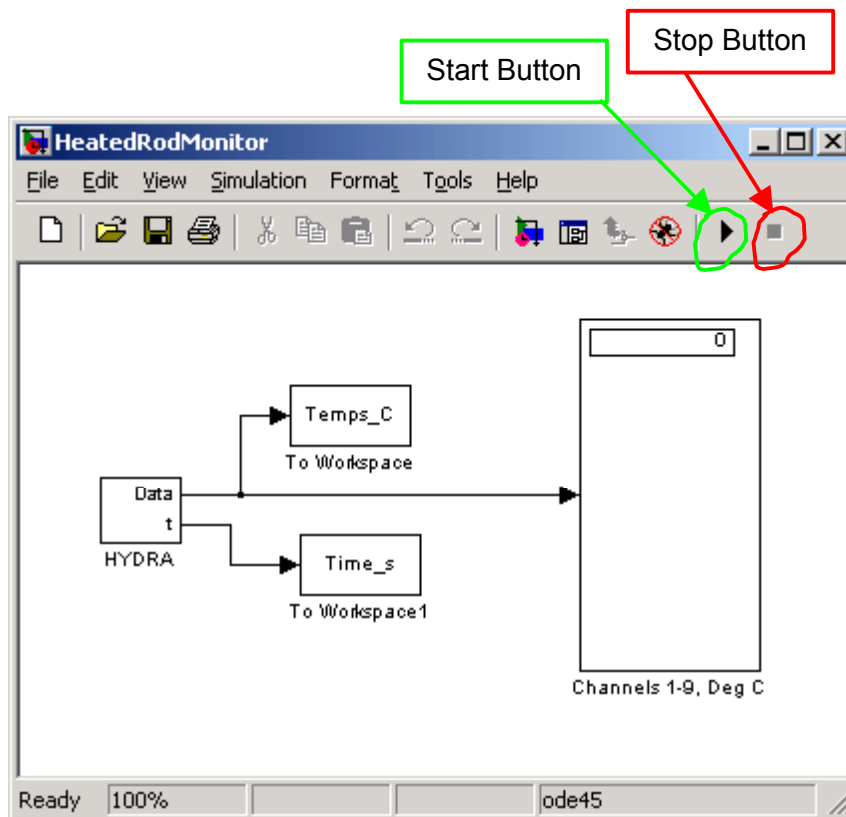
Monitoring the heated rod temperatures

I have defined a MATLAB (Simulink) interface to the experiment. To use it:

1. Verify that the Fluke Hydra is turned on (electronic device connected to the thermocouple wires). If not, push in the green button near the bottom of the front panel.

(Don't push any of the other buttons. If you do, or if the Hydra doesn't seem to be working properly, try turning it off and on.)

2. If necessary, start the computer. Log in with User Name = Student. Leave the password box blank.
3. Start MATLAB R12 (see icon on desktop).
4. In the MATLAB Command window, type "HeatedRodMonitor" (without the quotes). A Simulink model should open. Its block diagram looks like this:



When you click on the *Start button*, Simulink will begin to collect data at 5-

second intervals¹. (The Start button also changes to a *Pause button*, and the *Stop button* to its right becomes active.) You should hear the Hydra unit “click” each time Simulink requests a measurement. At each request, the Hydra scans thermocouple channels 1-9 as rapidly as possible, sends the data to Simulink via a serial communication link, and then waits until the next request. The latest measured temperatures will appear in the box labeled “Channels 1-9, Deg C”.

NOTE: Thermocouples 1-7 measure the rod temperatures. See the diagram on the box for the location of each. Thermocouples 8 and 9 measure the water inlet and outlet temperature, respectively.

5. At the end of the specified *Simulation Time*, Simulink will stop the data acquisition. You may also hit the *Stop button* at any time. The following will occur:
 - a. Simulink will plot the rod’s temperature profile (readings from thermocouples 1-7). There will be two profiles: one representing the time you pushed the start button, and the other representing the time the data acquisition stopped. These may be superimposed if the temperatures haven’t changed significantly during the data acquisition run.
 - b. You’ll be given the opportunity to save the data in a plain text file, which you can then load into Excel, etc. This will be in a tab-delimited format. The first number in each row is the elapsed time in seconds. The temperatures for thermocouples 1-9 follow (degrees C). The number of rows will depend on the duration of the run.

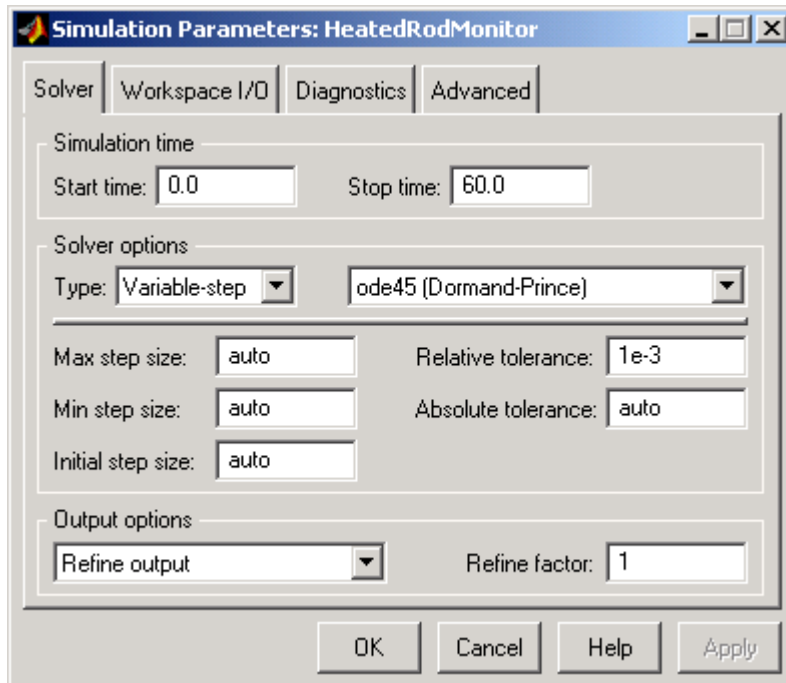
By default, files are stored in the My Documents folder of the Student user profile.

If you know how to use MATLAB, you will also find the time and temperature values saved in the workspace. The variable names are *Time_s* and *Temps_C*, respectively. These are overwritten each time you run the program, however.

6. I configured the *Simulation Time* so the data acquisition runs for one minute. This is appropriate if you are checking to see whether the system has reached steady-state (as when measuring thermal conductivity). It may be too short for a transient run, however (*e.g.*, when measuring thermal diffusivity).

To change the *Simulation Time*, open the *Simulation* menu (on the HeatedRodMonitor window), and select *Simulation Parameters*. You will see a window like the one below. Set the *Stop Time* to the desired value (in seconds). If you are unsure, set it to a large value, and use the *Stop button* to terminate the run manually.

¹ If you wish to change this, open the HYDRA block, and set the Sampling Period to the desired value.



7. At the end of the day, transfer any data files you saved on the hard drive to a floppy disk, and delete the ones on the hard drive (if you don't do this they may be deleted by someone else, so beware!).