Overview

This is a quick tutorial which explains how to use SLControl to run isotonic twitch experiments. If you are having problems, speak to Ken.

Additional resources

Need more help?

Check the resources, and then see Ken

Main content

**Part 1: Using the Redmile Setup**

On the Red Mile setup

1. Start SLControl.  You probably need to right-click the icon and "Run as Administrator".  This is because it is a custom SLControl build.
2. Experiments->Length Control
3. Pick the right-most tab in the experiment window (Freeform)
4. Browse and select a freeform text file. The default is c:\temp\freeform\_file.txt. The file is ASCII text and should look like this

3  
4   0.0001   260000 c:\temp\freeform\_no1.dap  
4   0.0001   260000 c:\temp\freeform\_no2.dap  
4   0.0001   260000 c:\temp\freeform\_no3.dap

The first line has a single number which is the number of SLControl records to collect.  
  
The subsequent lines (one for each record) have 3 numbers and a file.

* + number of input channels (in this case, 4)
  + time interval (seconds) between points (0.0001 corresponds to 10 kHz sampling rate)
  + total number of points (260000 = 65000 points per channel \* 4 channels)  
    [Note, don't go above 65000 points per channel because of DAPL pipe issues]
  + the file containing the DAPL code (see below)

Note, if you change this file, you need to reload it into SLControl. The easiest way is to un-check and then re-check the tick box in the SLControl Freeform tab.

1. An example DAPL file is included below. The only bit you should modify without speaking to Ken is this section

// Header for triggered output

var pretriggersamples = 10000 LONG

var isoton = 6000

var isoinc = 0

var nsamples = 60000 LONG ;\*\* Don't make bigger than 60000

var isopoints = 10000 LONG

var ramppoints = 1000 LONG

var propgain = 2500

var flpolarity = -1

var flswitch = 1

var flthreshold = 10

var smoothing\_points = 10

var gain\_asymmetry = 0     ; positive value here helps the downward drift when the motor reverses

|  |  |
| --- | --- |
| pretriggersamples | the number of timepoints to skip before trying to initiate tension control. |
| isoton | the voltage level to try and hold force constant at. -32767 = -5 Volts 0 = 0 Volts 32767 = +5 Volts |
| isoinc | 1/1000th the voltage level to change the hold force constant at.  A non-zero value changes the isoton value for each clock interaction by 1/1000th of the number. |
| nsamples | the number of timepoints after which FL will be forced back to zero irrespective of tension control mode.   Keep less then 60000 to make sure the motor returns to zero. |
| isopoints | the number of timepoints to hold isometric after breaking out of tension control mode. |
| ramppoints | the number of timepoints over which to ramp FL back to zero. |
| propgain | the gain of the servo system, 0 is nothing (FL won't move), 10000 is likely to be too much. Note, it's better to start low and build gradually up. |
| flpolarity | Same as FL\_Polarity for SLControl. Does increasing FL stretch muscle (+1) or shorten it (-1). |
| flswitch | controls the method of determining when to turn off the isotonic hold. =0 *when the motor relengthening velocity reaches the flthreshold, the system will break out into isopoints and ramppoints.* =1 (else) *when the motor position meets flthreshold, the system will break out into isopoints and ramppoints.* |
| flthreshold | how quickly to exit isotonic control when the motor starts to reverse direction.  for flswitch=0 *0 is likely too sensitive (system jumps to isometric hold too quickly). Not sure yet of maximum number.* for flswitch=1 (else) *a non-zero (positive) value will be appropriate for noisy signals.  A negative (shortening) value will never try to hold because the motor is already past that length.* |
| smoothing\_points | Defines how many points to average (look at).  It looks at n-1 differences.  If the motor is moving randomly, the output difference is near zero, but if it is always up or down, then it will give you a positive or negative number. |
| gain\_asymmetry | When the motor starts relengthening (reverses), adds gain to prevent a downward drift. |

**Part 2: Example DAPL**

reset

option underflowq=off

option errorq=off

option scheduling=fixed

option buffering=off

option quantum=100

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

pipes ptrigger

// Header for triggered output

var pretriggersamples = 10000 LONG

var isoton = 6000

var isoinc = 0

var nsamples = 60000 LONG ;\*\* Don't make bigger than 60000

var isopoints = 4000 LONG

var ramppoints = 5000 LONG

var propgain = 120

var flpolarity = -1

var flswitch = 1

var flthreshold = 1

var smoothing\_points = 10

var gain\_asymmetry = 0     ; positive value here helps the downward drift when the motor reverses

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

pdef control

  isotwitch(ip0,ip2,pretriggersamples,isoton,isoinc,nsamples,isopoints,ramppoints,propgain,flpolarity,flswitch,flthreshold,smoothing\_points,gain\_asymmetry,op1)

  ptrigger=0

  copy(ptrigger,op0)

  merge(ip(0..3),$binout)

end

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

odef output\_def 2

  outputwait 2

  update burst

  set op0 a0

  set op1 a1

  time 50

end

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

idef input\_def 4

  set ip0 s0

  set ip1 s1

  set ip2 s2

  set ip3 s3

  time 25

  count 260000

end

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

start control,output\_def,input\_def