* 5cm diameter donut actuators, 0.5mL fill per pouch quadrant
* Carbon elastomer electrodes, 3cm diameter
* Linear testing stand with no load besides 136g mass of shaft and plates
* Weigh paper between actuator and top & bottom

Signal:

* 0.5Hz positive polarity ramp square wave (what value ramp?)
* Reversed polarity between tests to restore original state (with same amplitude)

Measurements:

* Laser displacement sensor (mm)
* 100Hz sampling rate (10ms increment)
* 100 second sampling time

Analysis:

Experiment setup:

+ There are some errors in the laser displacement sensor when measuring the displacement of 18um BOPP with maximum activation voltage at 5kV (Experiments need redo)

+ Voltage ramp data not recorded

Data Collection:

+ Would the plots look better if we had displacement versus cycles rather than seconds?

Preliminary Results:

+ In the same operable voltage (< 6kV), TPU performs much better (higher stroke) than the BOPPs

+ At 6kV, tpu requires longer time than each period of voltage cycle to return to initial state after being activated. (This is why we see that the lower bound begin to drift up).

+ In all plots, 15um BOPP shows much better performance than 18um BOPP and have much less charge retention (while it is still noticeable)

+ A closer look at the displacement versus voltage (not shown, but can be seen in figure 5 and 6) shows the difference between the 15um BOPP and 18um BOPP. When the voltage returns to zero and go back up, 15um BOPP shows a smooth relaxation and activation. In the case of 18um BOPP, the charge retention causes the actuator to hold its displacement when the voltage returns to 0, but to causes a short-time relaxation when the high voltage increases

+ As can be seen, the charge retention becomes more pronounced as the number of cycles increases for the case of 18um BOPP