Robot Control Lab 5

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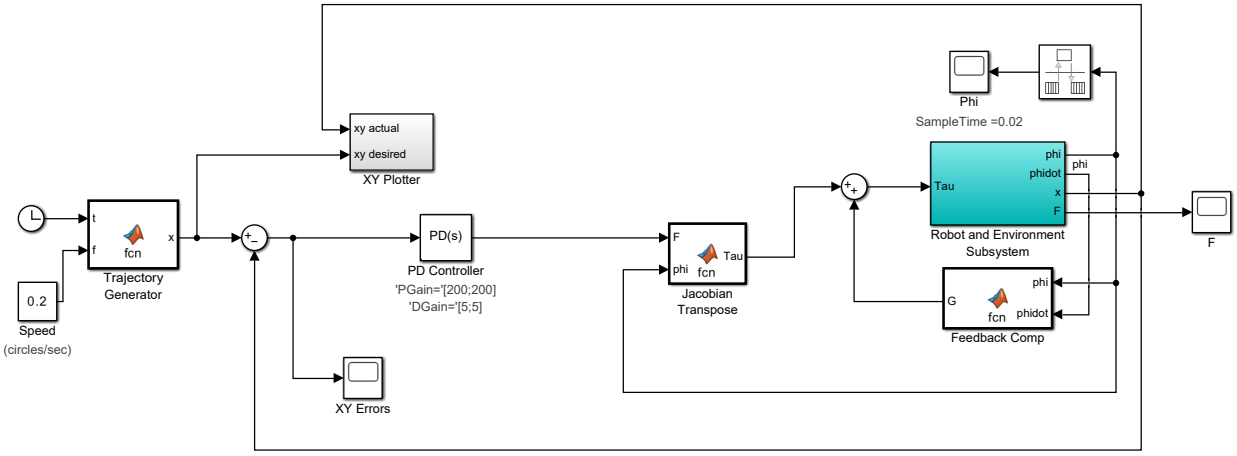
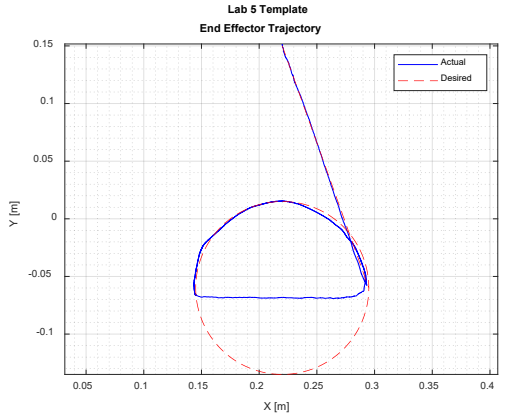
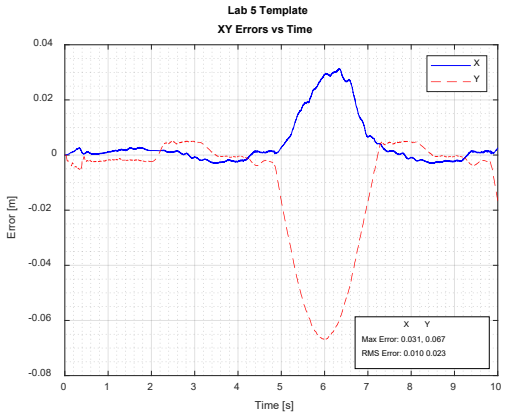
1 Lab 5 Template

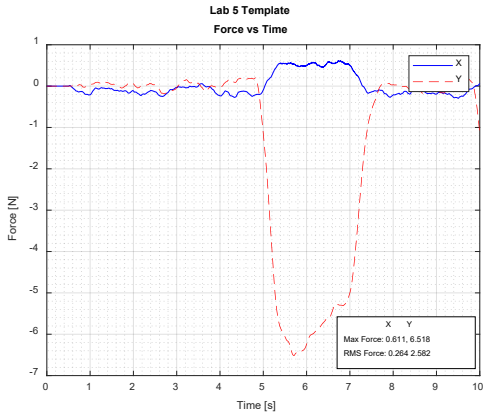
1.1 Simulink Model



1.2 PLOTS





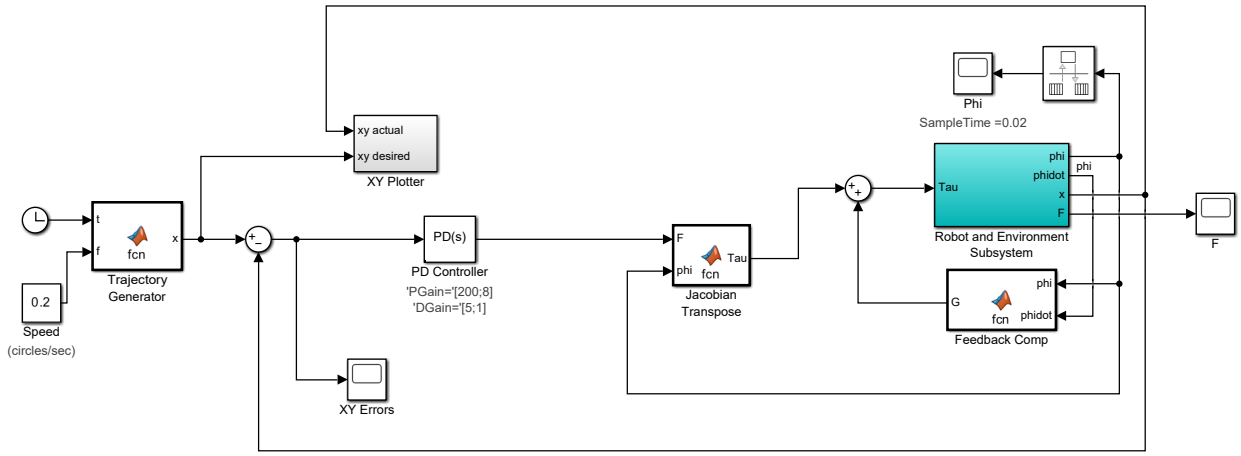


1.3 ANALYSIS

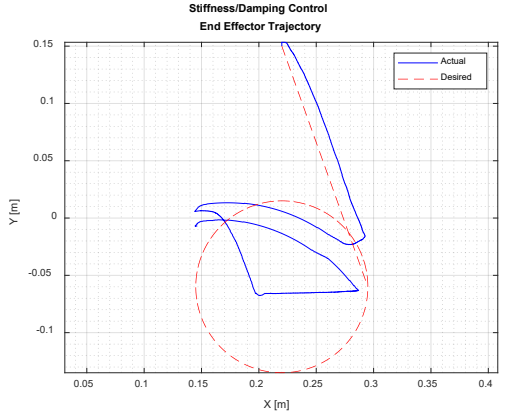
This controller was the default and didn't work very well. Really high force, but good trajectory following. If our priority is on tracking, this is the best controller.

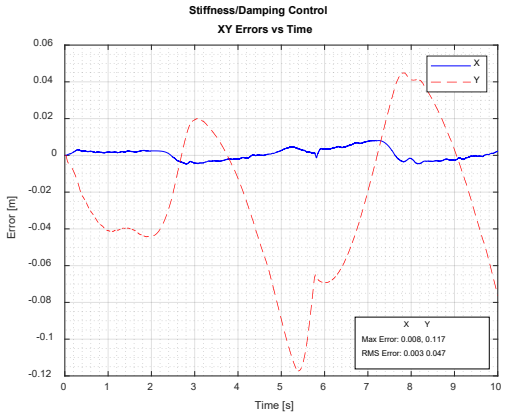
2 STIFFNESS/DAMPING CONTROL

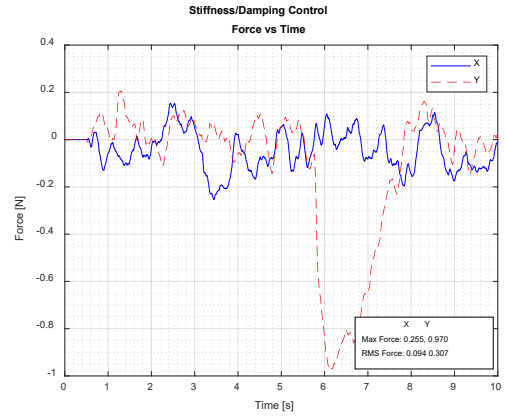
2.1 SIMULINK MODEL



2.2 PLOTS





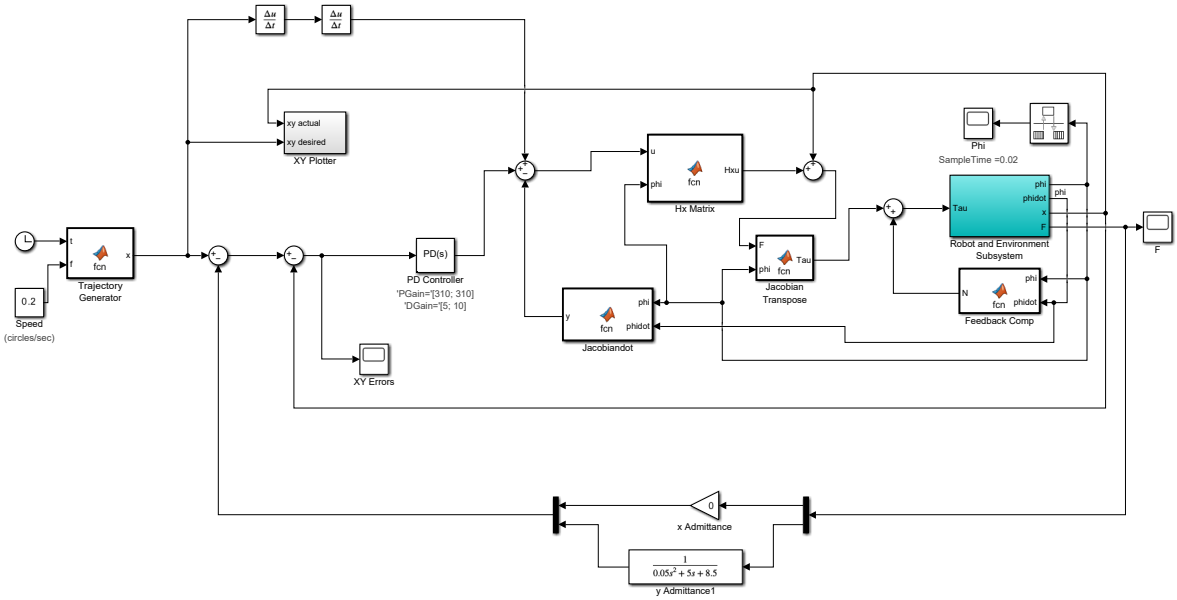


2.3 ANALYSIS

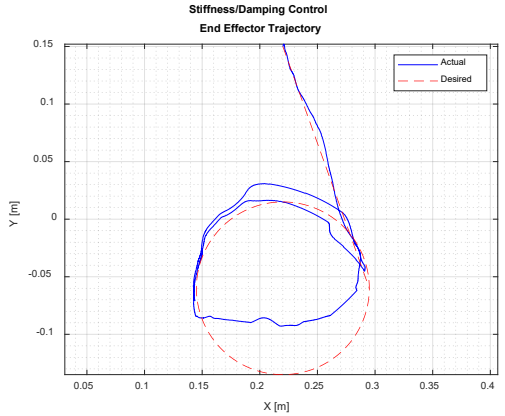
This had good force following, but a terrible trajectory. To satisfy the y force requirement/goal we needed to modify the PD gains so that we'd have a controller that didn't push harder into the table. That led to a control effort that was less effective than the previous PD controller.

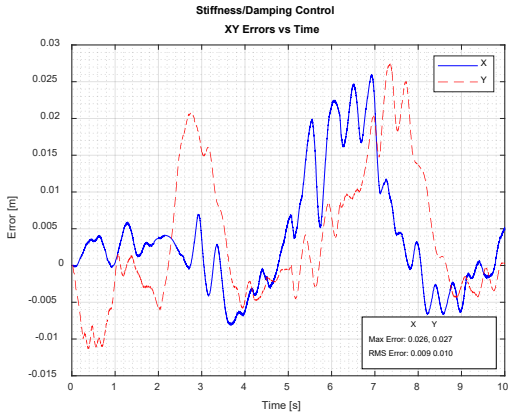
3 Compliance/Admittance Control

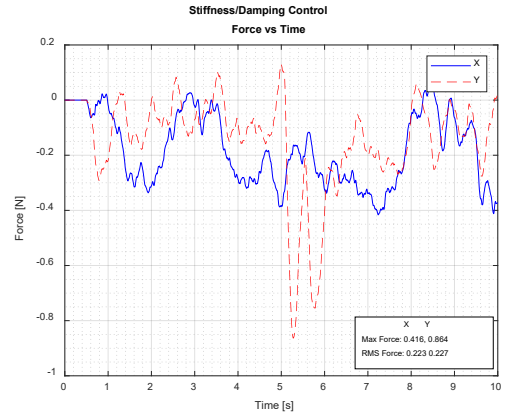
3.1 Simulink Model



3.2 Plots







3.3 ANALYSIS

This took a ton of time but was an effective controller in both the trajectory and force following. It did have higher trajectory error but was still able to follow the circle in a reasonable pattern, and satisfy the force requirement. We originally tried to implement a compliance controller, but we couldn't get the compliance and PD gain turning down to where we were satisfied. Ultimately, we ended up using an admittance controller that effectively balanced force and trajectory. The gains can be seen within the Simulink model.