AH\_NREL READ ME

Simulink Files:

* simplestAH.slx
	+ Simulink model that allows motion only in heave
* simpleAH.slx
	+ Simulink model with two rotational constraints
		- One at the bottom of the WEC
		- One at the bottom of the mooring line
		- Allows for pitch and surge as well as heave

How to Get Free Decay Time History:

* Run a single run of wecSim in AH\_NREL folder
	+ For the free decay set k = 0.1 and c = 0
	+ Set the linear viscous damping term
* Go to AH Free Decay folder
	+ Load one of the .mat files
		- Ex. load('20211203T090016Z.mat')
	+ Run Heave\_Script\_R0.m
		- Analyzes experimental data
	+ Run timeHistComp.m
		- Uses results from heave script for time history comparison
	+ Use saveTimeHist.m to record different runs for comparison
		- Includes graphs to compare the different runs
		- Currently the saved results clear when the workspace does
			* So recommend running individual sections to avoid errors related to missing saved runs after the workspace is cleared

How to do an RAO Calculation:

* Go to main AH\_NREL folder
* Build appropriate mcr
	+ Run mcrbuild.m
* The userDefinedFunctionsMCR.m file uses findPos.m and findPTOforce.m to record data on all of the max positions and PTO forces for all of the runs
* Run wecSimMCR
* Run RAOposNforce.m

Impedance:

* Go to hydroData folder
* Run bemio.m
* Run impedance4DampTuning.m

Comparing the Added Mass of Different BEMIO Results

* Go to hydroData folder
* Look at plotAddedMass.m
* Change the “files” variable to include the h5 files of interest
* Run plotAddedMass.m
* Notes
	+ The script uses the h5toAddedMass function
	+ h5tohydro.m is a draft of plotAddedMass.m

Running Model Free Decay Analysis

* Step 1: Finding Pretension
	+ Calculate the mass of the displaced volume of the model
		- Multiply by density of water
	+ Subtract that by the mass of the model
		- 4600kg
	+ Multiply that remaining “mass” by the acceleration of gravity to get the pretension force
		- Can round the value
	+ Check the value:
		- Go to AH\_NREL folder
		- Adjust wecSimInputFile.m to have the pretension value and no waves
			* Don’t need to include linear damping
		- Run wecSim
			* Check the amount of motion and position of the WEC in the water
* Step 2: Free Decay: Find Natural Period
	+ Go to AH\_NREL folder
	+ Adjust wecSimInputFile.m to have the initial position, pretension value, and no waves
		- Don’t need to include linear damping
	+ Run wecSim
	+ Run findResponseT.m to find the avgPeriod or natural period

Finding total damping coefficient from experimental data

* Go to AH Free Decay folder
* Load one of the .mat files
* Run Heave\_Script\_R0.m
* Go to dampTresponse.m
* Write in the “start\_time” for the analysis
	+ Reasonable time avoiding noise before experiment actually started
* The resulting damping coefficient will be called “scaleC”

Finding linear viscous damping coefficient for a single BEMIO model

* Go to hydroData folder
* Run bemio.m for the desired model
* Go to findLinViscDamp.m
	+ Alter “natT” to match the natural period of the model
	+ Alter “C\_total” to include the average damping coefficient of the experimental models
		- Found after running dampTresponse.m for all three .mat files