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