%% ASEN 3112: Structures

% Lab 3 - Vibrations

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% Created on: April 11, 2022

% Last updated: April 12, 2022

% Purpose: Plots response on the system as a function of the excitation

% frequency (with a magnification factor applied).

%% Housekeeping

clc

clear all

close all

%% Reading Data file, Manipulating, and Plotting

%%% Read in data:

Data1a = readtable('ASEN3112\_Lab3\_1');

Data1 = table2array(Data1a);

%%% Fix time data incase the machine time was never reset:

Data1(:,1) = Data1(:,1) - Data1(1,1);

%%% Sampling Frequency + range of frequencies:

sz = size(Data1);

Fs = 1/(Data1(2,1)-Data1(1,1)); % Sampling frequency

f = Fs\*(0:(sz(1)/2))/sz(1); % Range of frequencies

%%% FFTs:

tail\_fft = fft(Data1(:,3));

wing\_fft = fft(Data1(:,4));

nose\_fft = fft(Data1(:,5));

%%% Tail fft manipulation:

P2 = abs(tail\_fft/sz(1));

P1 = P2(1:sz(1)/2+1);

P1(2:end-1) = 2\*P1(2:end-1);

%%% Wing fft manipulation:

P4 = abs(wing\_fft/sz(1));

P3 = P4(1:sz(1)/2+1);

P3(2:end-1) = 2\*P3(2:end-1);

%%% Nose fft manipulation:

P6 = abs(nose\_fft/sz(1));

P5 = P6(1:sz(1)/2+1);

P5(2:end-1) = 2\*P5(2:end-1);

%%% Plotting FFT:

figure

hold on

plot(f,P1/max(P1))

plot(f,P3/max(P3))

plot(f,P5/max(P5))

xlim([1 51])

xlabel('Frequency [Hz]')

ylabel('FFT Amp.')

title('FFT')

legend('Tail','Wing','Nose','Location','northwest')