Alice Ren

Data I

October 26, 2017

HW 4

1. The three major peaks are at 1.929 cycles per day, 1.008 cycles per day, and 0.9214 cycles per day. These corresponds to periods of 1/1.929, 1/1.008, and 1/0.9214 days which is 12.44, 23.81, and 26.04 hours. They correspond very well to the M2, K1, and O1 tidal periods respectively which were 12.42, 23.93, and 25.82 hours.
2. The mean pressure is the amplitude of the first Fourier coefficient, a_0. It is 3.49 db. The amplitude for the M2, K1, and O2 frequencies are 0.5215, 0.3591, 0.1802 respectively.
3. The spectral peaks align with the results from the least square fit very well. Those amplitudes were 0.5258, 0.3799, and 0.1699 for the M2, K1, and O2 frequencies respectively. Perhaps you could plot the frequencies and amplitudes of the least square fit and the Fourier transform on the same plot.
4. The spectrum is red since it has higher energy at low frequencies. If you were to differentiate your system in time before Fourier transforming, the spectrum would be blue. This is because the time derivative after Fourier transforming is equal to multiplying by the frequency; taking the derivative before or after Fourier transforming is equivalent. The frequency increases along the x-axis away from zero; thus, you will get a blue spectrum with the derivative.