ASTP720: Homework 7

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May 2, 2020

1   Fourier Transform

I used numpy.fft.rfft to do the fourier transform and to get the frequency values up to the nyquist frequency. I then normalized the fourier transfrom by the number of data points and multiplied by two to account for negative frequencies. Then I multiplied the result by the complex conjugate of itself, which gives the power spectrum. From there I determined that the spike was at a frequency of 0.00116 Hz. This spike had an amplitude of approximately $10^{-40.1}$. I took the square root of that to get the amplitude of the sine wave component. By solving for R and plugging Eq. 2 from the assignment into Eq 3 and solving for mass, I found the mass of the system to be $3.2 M_\odot$. I then used the mass and Eq 3 to calculate the separation, which was found to be $1.34 R_\odot$
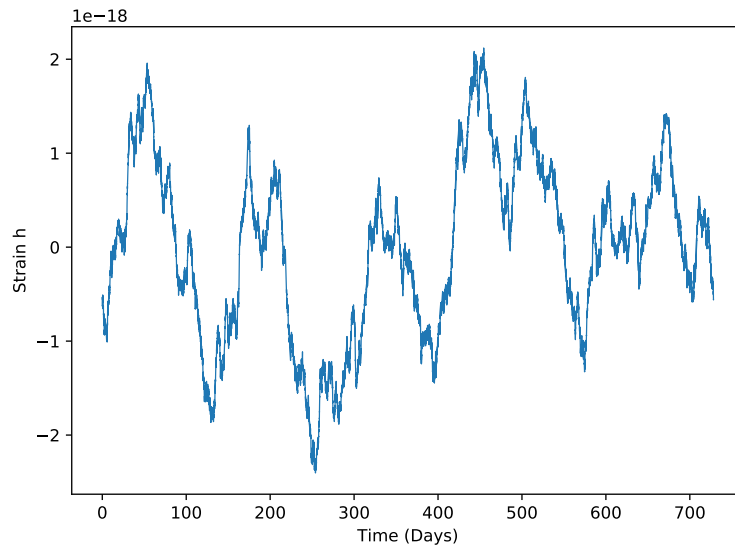

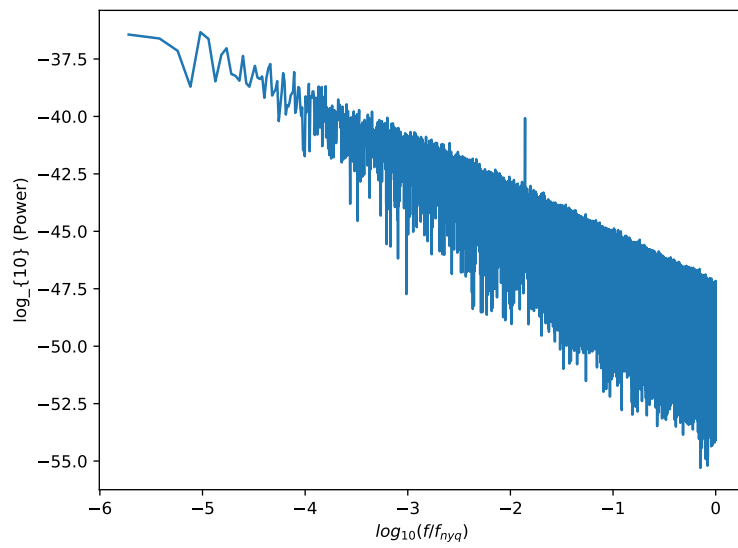Figure 1: The time series data from strain.npy

Figure 2: The power spectrum of the time series from Figure 1. The spike represents the frequency of the sin wave.