Homework 3

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Computational Physics

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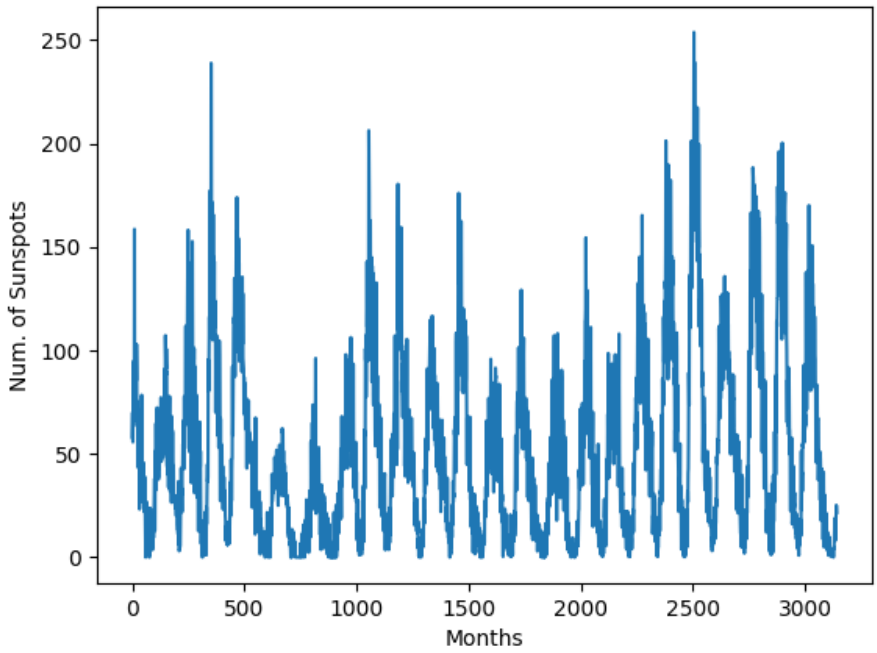
Problem 1. It appears there are 24 sunspot peaks in this set of data, so the frequency of them is about $2 * \pi * \frac{24}{3100}$, which a frequency of .0486 per month or .584 per year. The

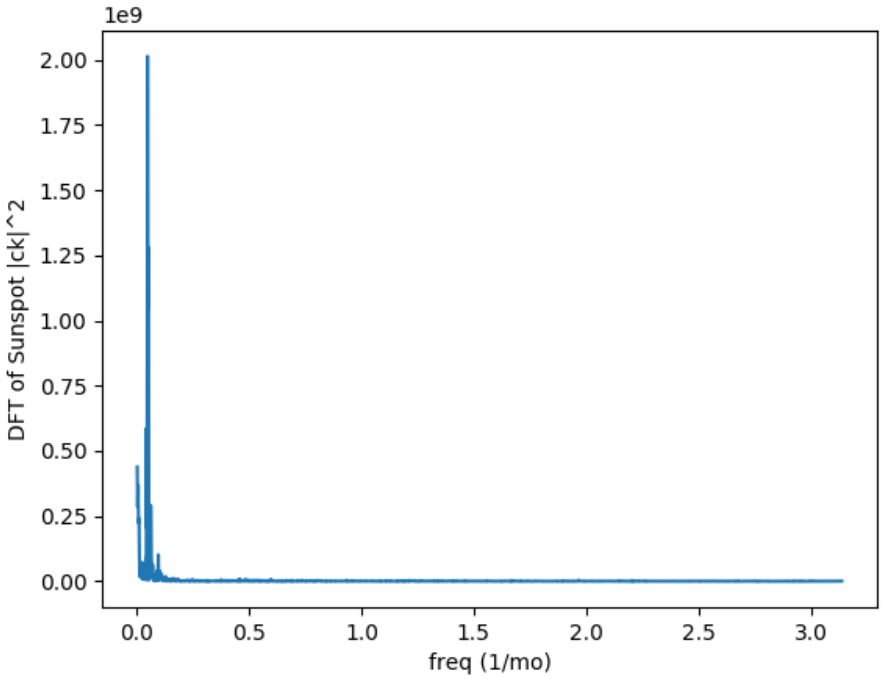


discete fourier transform is plots the fourier coefficients mod squared $|c_k|^2$ with respect to it's frequency $1/mo$. The maximum here occurs at .04598 $1/mo$. This is not too far from my estimate frequency.

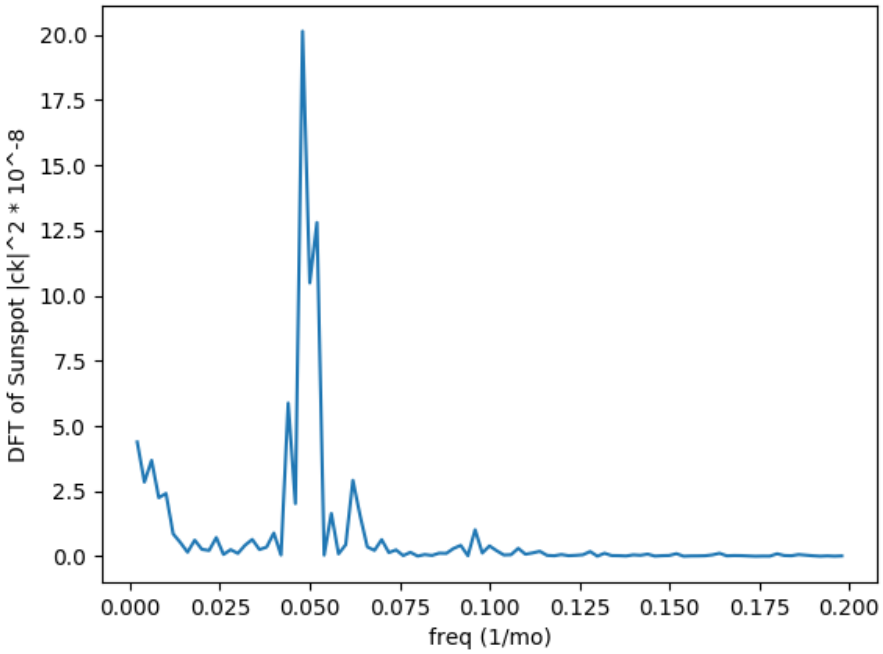
Problem 2. Below is the original image, the point spread function,

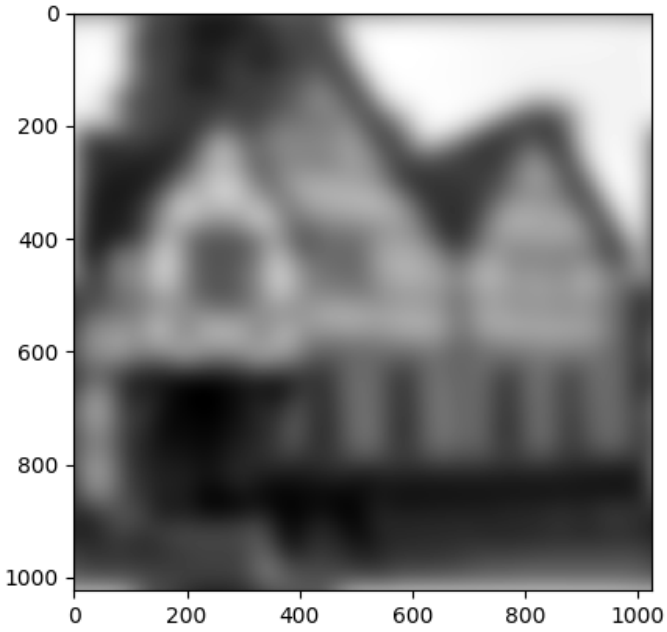
$$f(x,y) = \frac{1}{2\pi\sigma^2} exp[-\frac{x^2}{2\sigma^2} - \frac{y^2}{2\sigma^2}]$$

and the new de-convoluted version with minimum epsilon 10^{-5}. The image is first fourier transformed then divided by gaussian point spread function with $\sigma = 25$. Then the image



inverse fourier transformed. The image cannot be fully restored because dividing by very small values of the point spread function leads to large error.


DFT of Sunspot |ck|^2 * 10^-8
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
freq (1/mo)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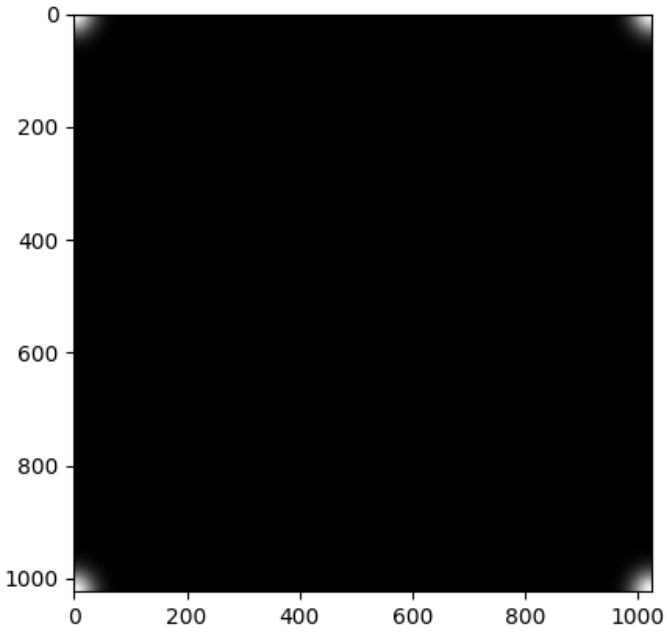
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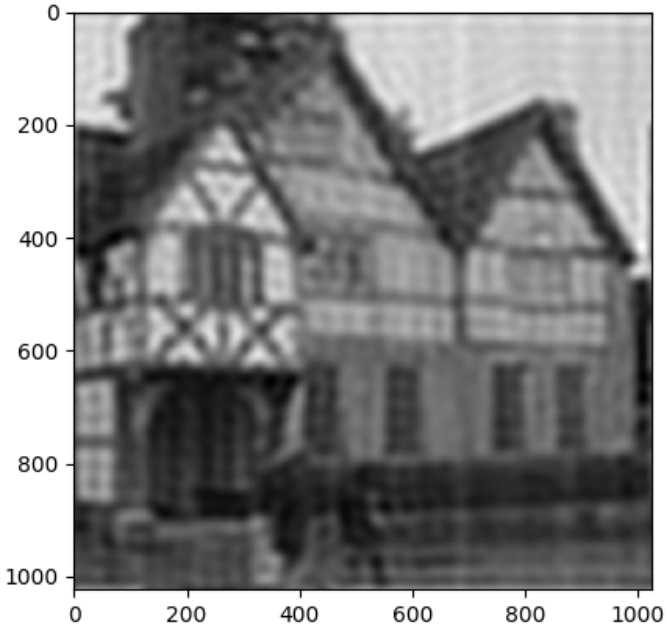
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