Assignment :03

Digital Image Processing

Name: **ROHIT KUMAR** Course: **MTech(A.I.)** Serial No. :**20963**

Question 1a:

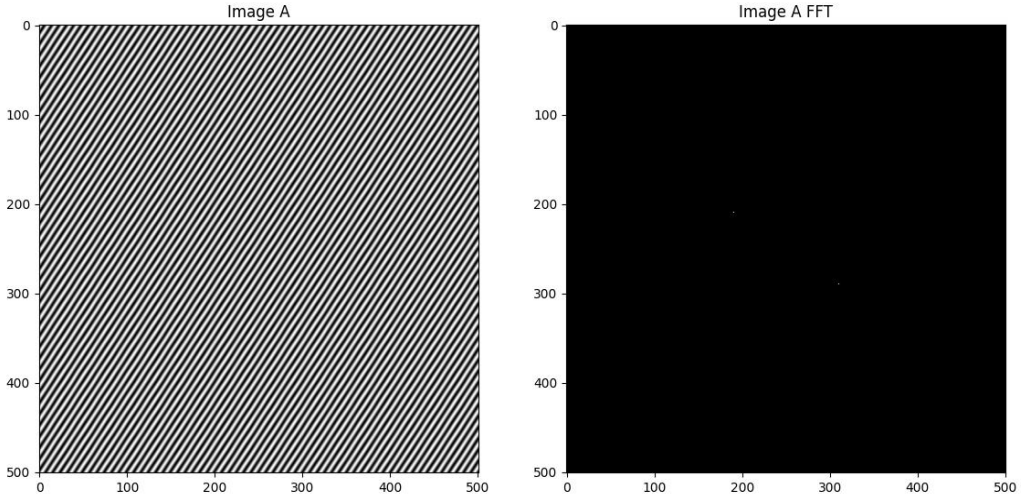

Fig:- Image A using sin(2πu0m/M + 2πv0n/N) where M = N = 501 and (u0, v0) = (40, 60) & its DFT

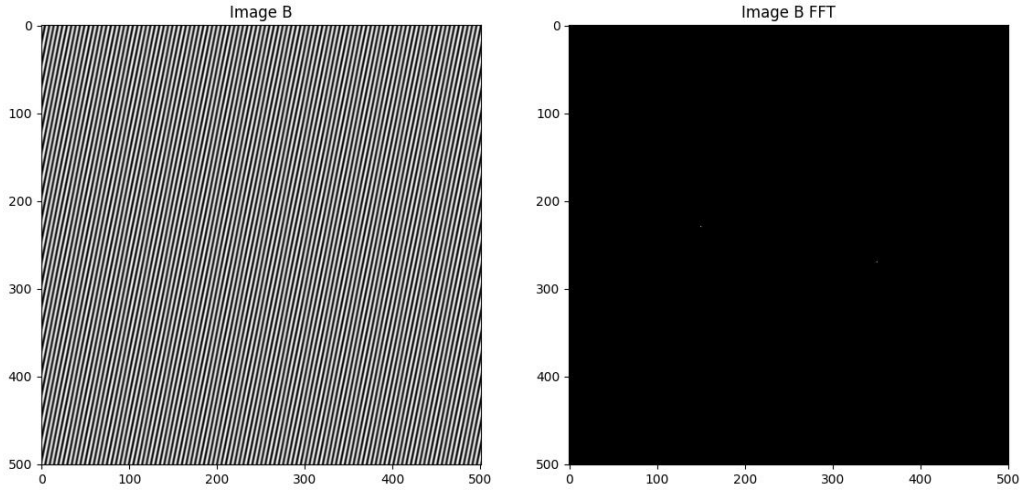

Fig:- ImageA using sin(2πu0m/M + 2πv0n/N) where M = N = 501 and (u0, v0) = (20, 100)& its DFT

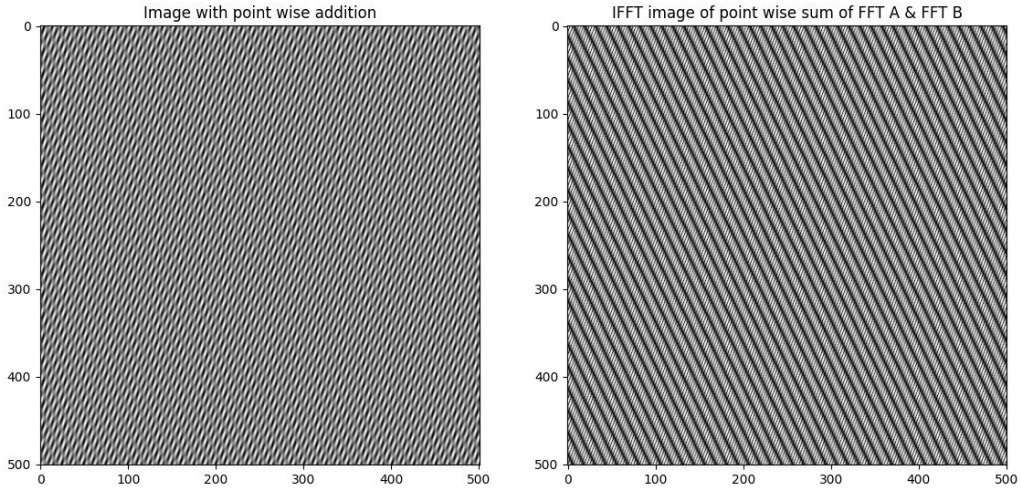

Fig: Image with point wise addition of image A & image B in space domain,

Image of IDFT of point wise addition of DFT image in Fourier domain and then IDFT.

Comments:

There were some artifacts when image was added Fourier domain and then IDFT taken. This may be due to digitalization of image at different stages.

There were two dots around origin of FFT image of A & B represents FFT of its.

Question 1b:

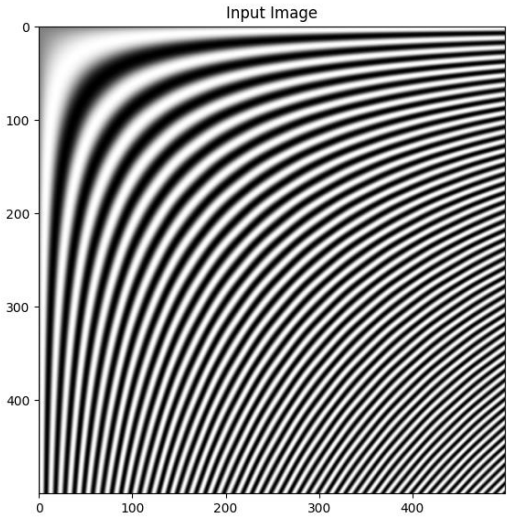

Figure: Input Image

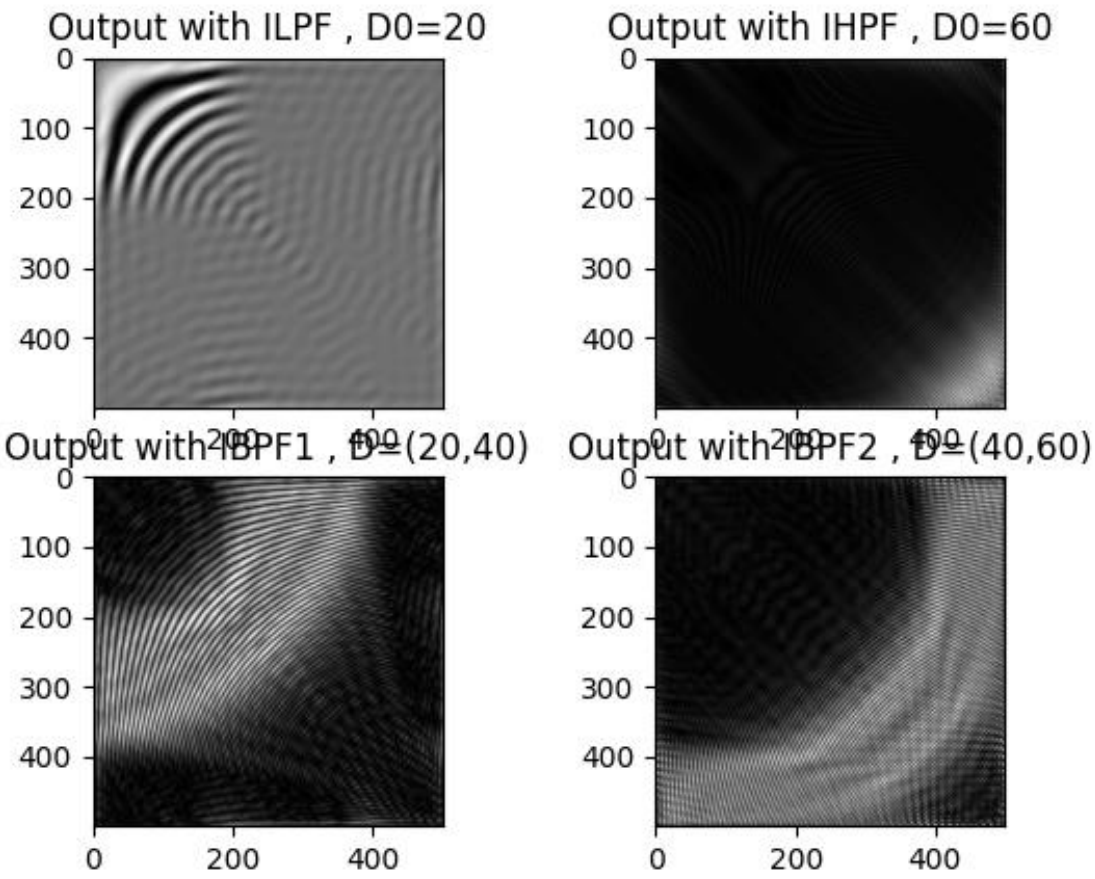

Fig:- Out image of Q1b

Comment:

As image frequency increases as we move from top left corner to bottom right corner. Some observations:

1. The low pass filter should show the part of image which has low frequency i.e., top left corner.
2. The high pass filter should show the part of image which has high frequency i.e., bottom right corner.
3. Band pass filter should show the band of frequencies which can be seen in between low frequency and high frequency region.

   All the results were according to expectations.

Question 1c:

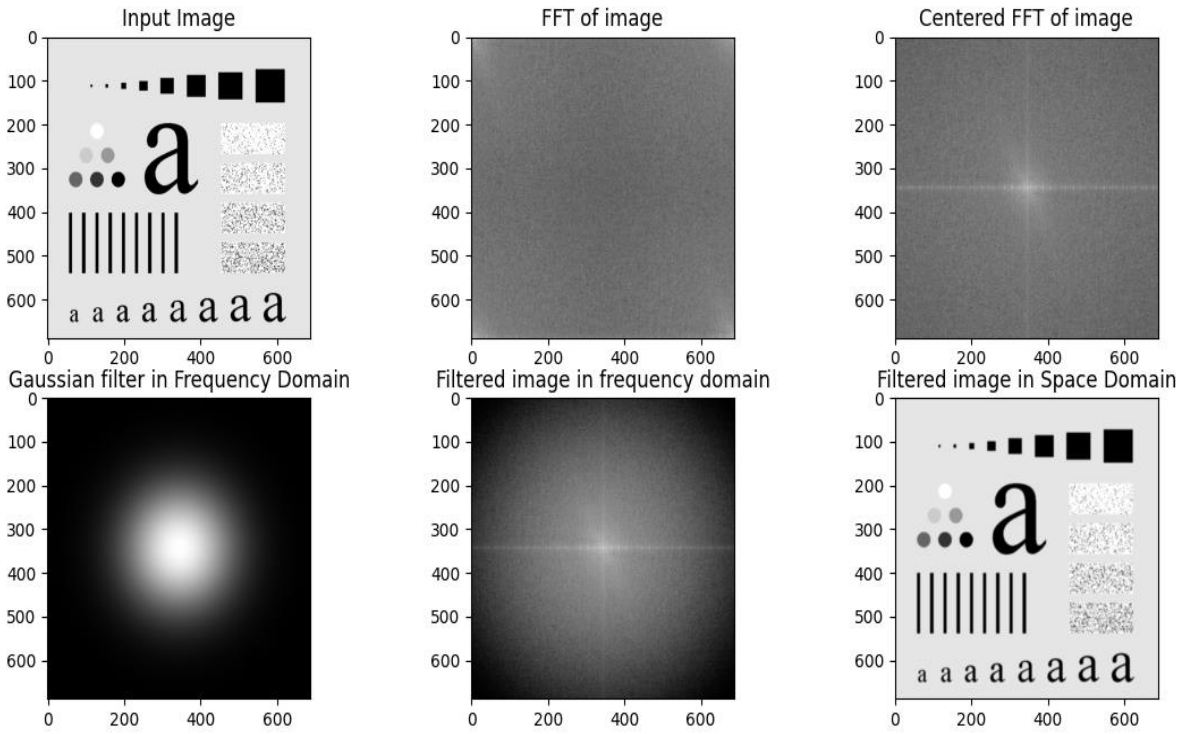

Fig:- Input and output at corresponding stages.

Comment:

No any significant arifacts were observed in the image.

Question 2a:

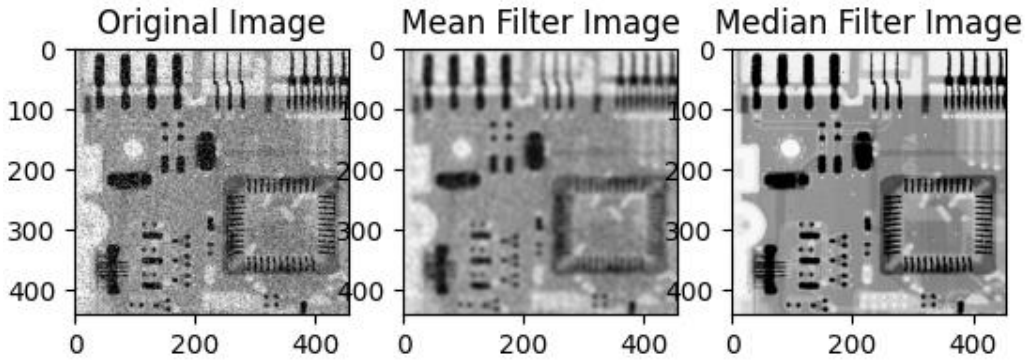

Figure : Input image, output with mean and median filter

Comments:

The mean filter did not remove the noise completely but median filter was able to do so.

Question 2b:

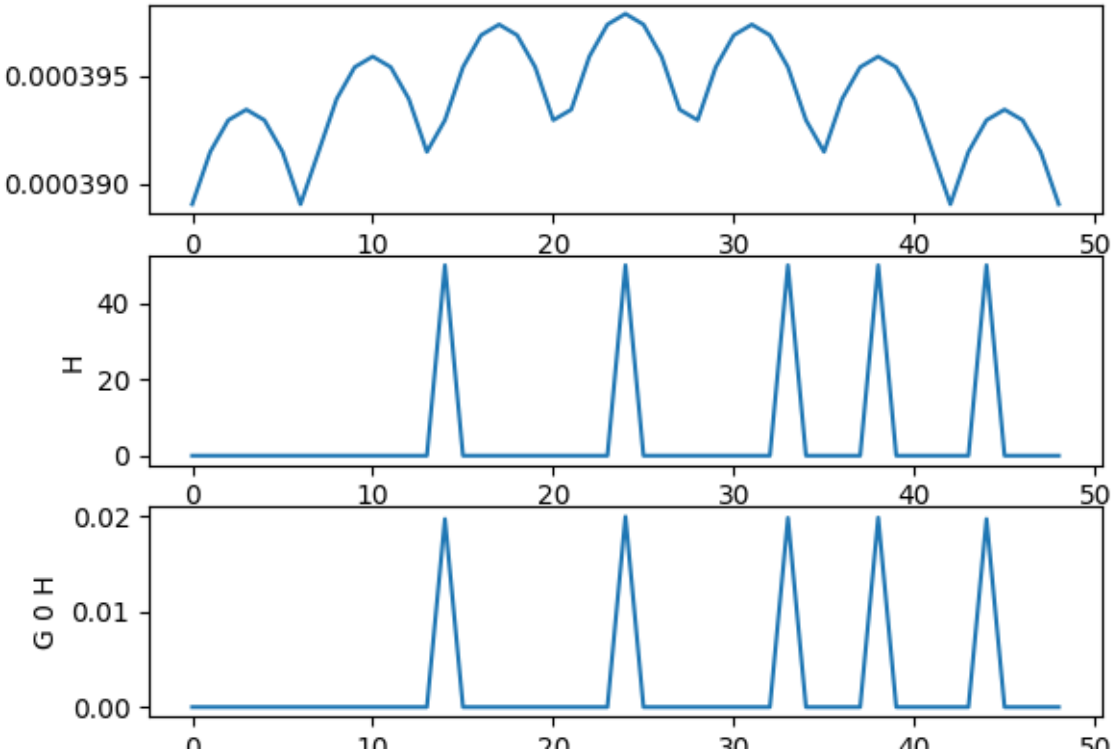

Figure:-Different plot with x-axis upto 49 as the window was (7*7)

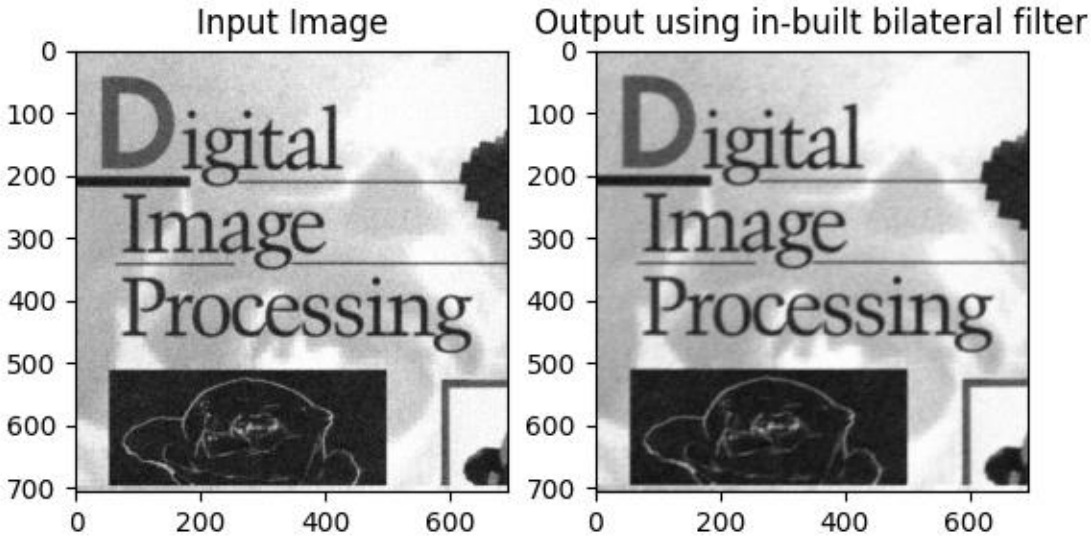

Figure:-Output using in-built bilateral filter

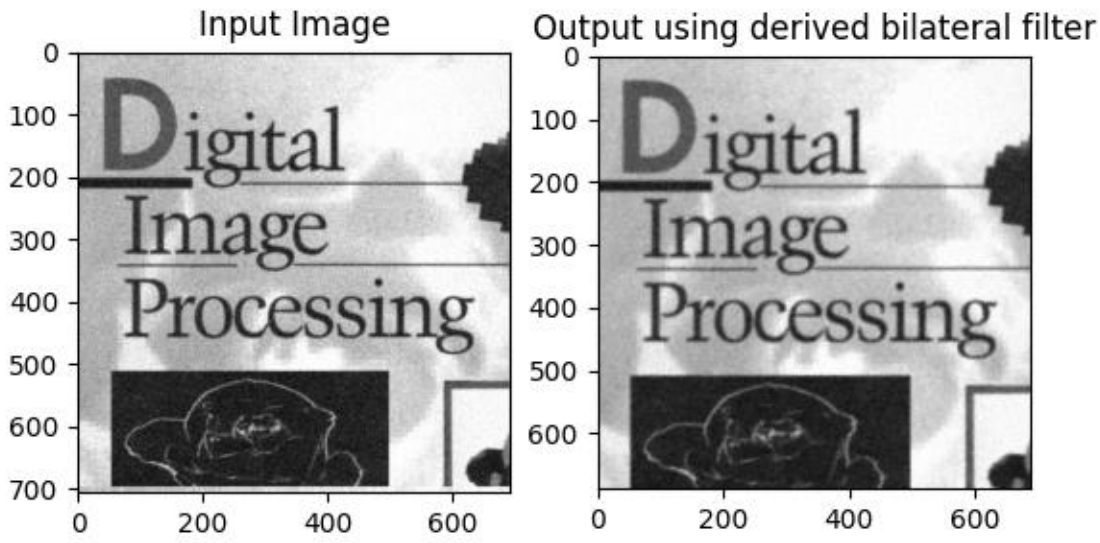

Figure- Output using derived bilateral filter

Comments:

Bilateral filter works with both the intensity and spatial domain detail with gaussian in nature.

It preserves the location whenever there is great change in the intensity of image unlike gaussian filter.

Question 3:

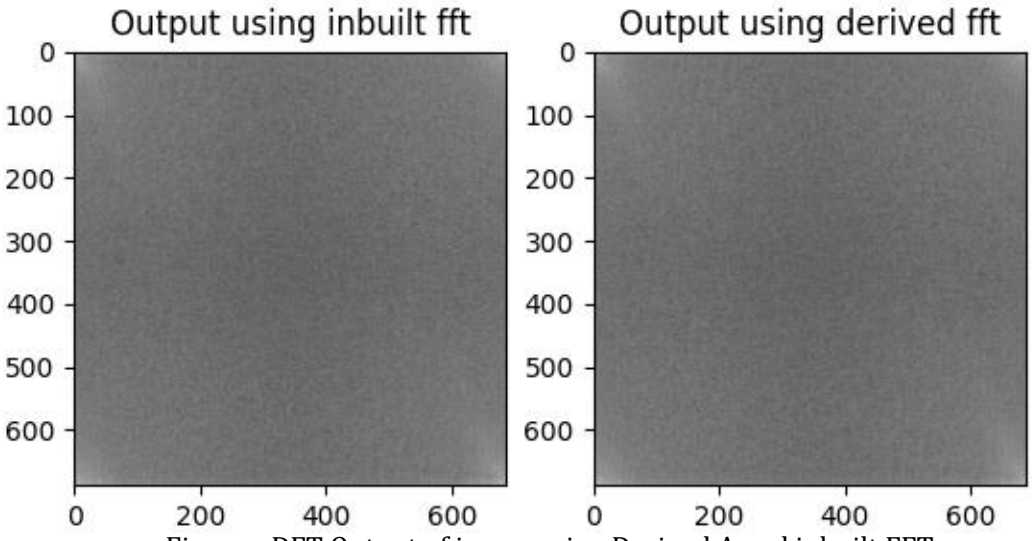

Figure:- DFT Output of image using Derived A and inbuilt FFT

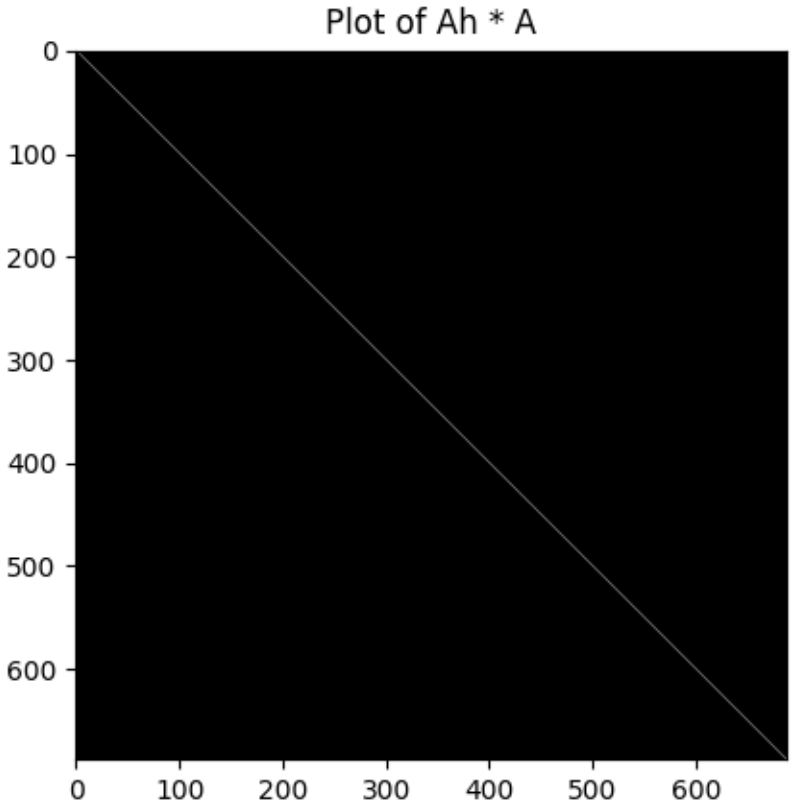

Figure: Ah*A

Comment:

The fft of derived and inbuit was same as the mean square absolute error was approximately 1.0545883490584674e-24

The line like structure was due to periodic nature and as A has various linear frequency in terms of

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w=-j*2*pi*m*n/M
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where m* n was variable.