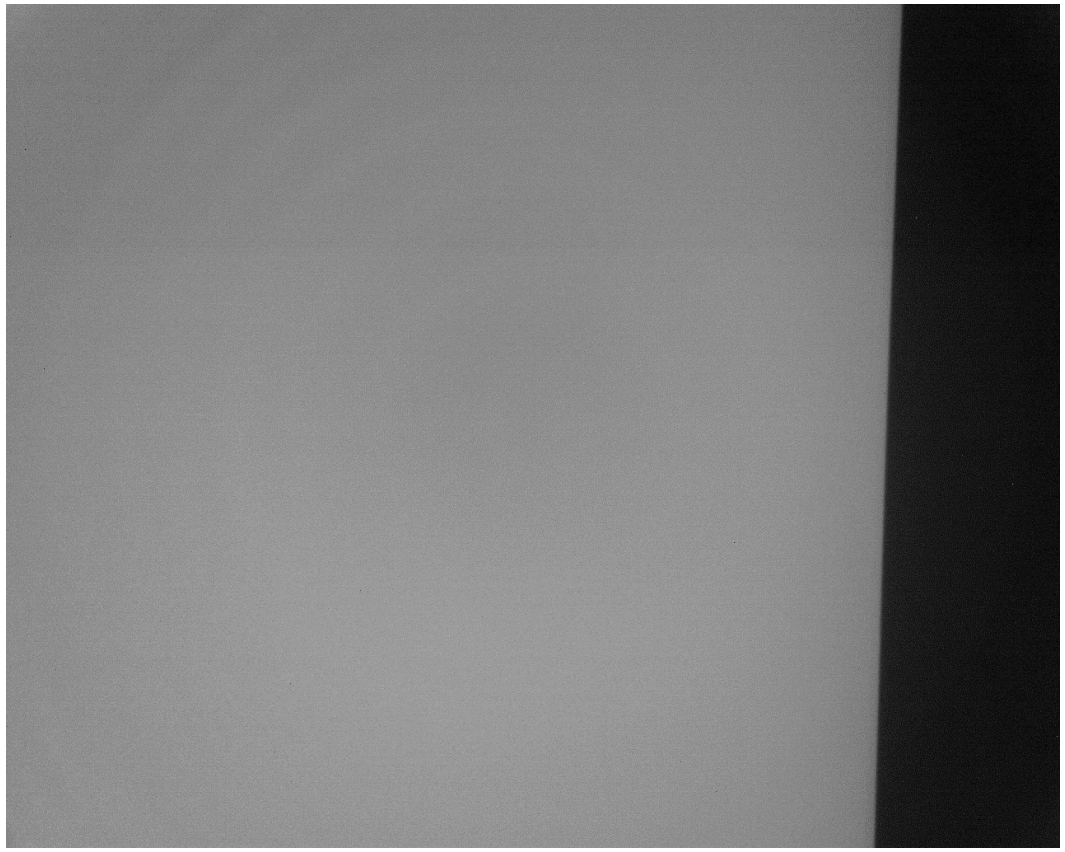
MTF measurement

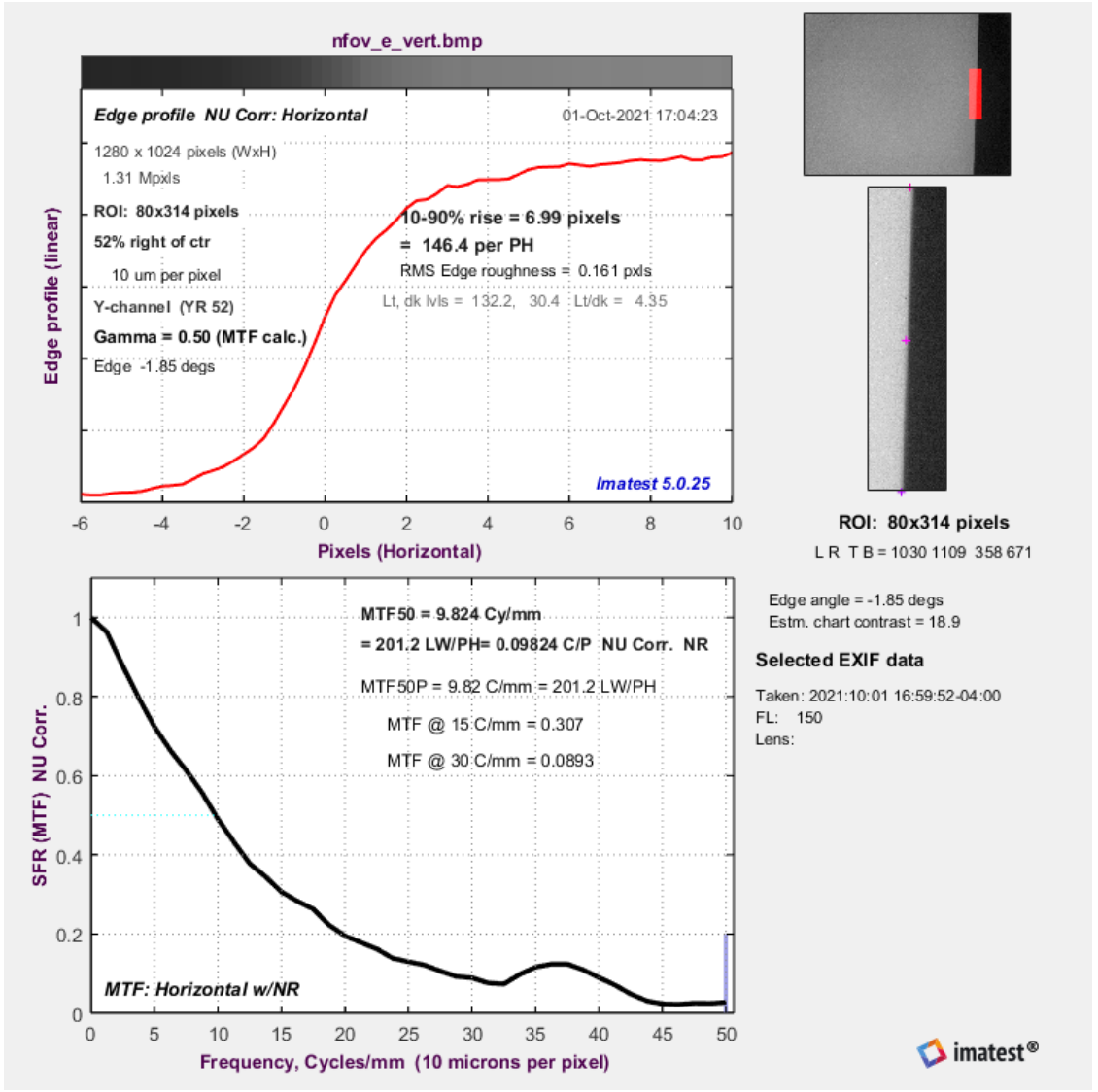
By Sang Moon

Modified from :
https://github.com/bvnayak/PDS_Compute_MTF/blob/master/PDS_Compute_MTF/PDS_Compute_MTF.py

Input image (sharp edge)



'M:/CAST/MTF/Images/z1200 mtf cell 1 retained-1001/nfov_e_vert.bmp'

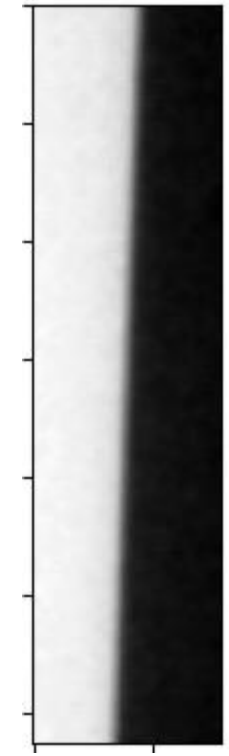


Result of Imatest

Improvement (modified):

- Increase the contrast by normalization : change the smallest pixel value to 0, the highest value to 255

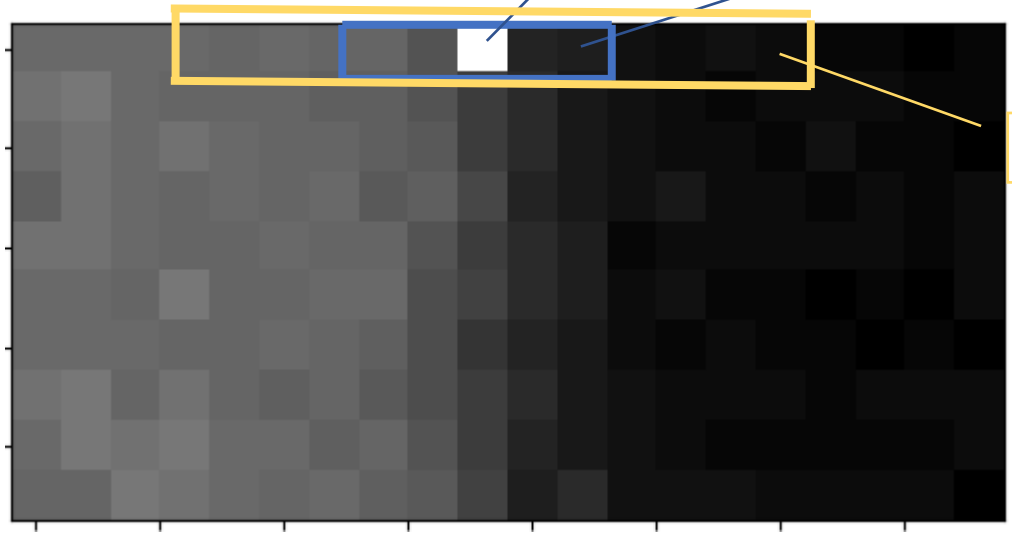
Edge detection part



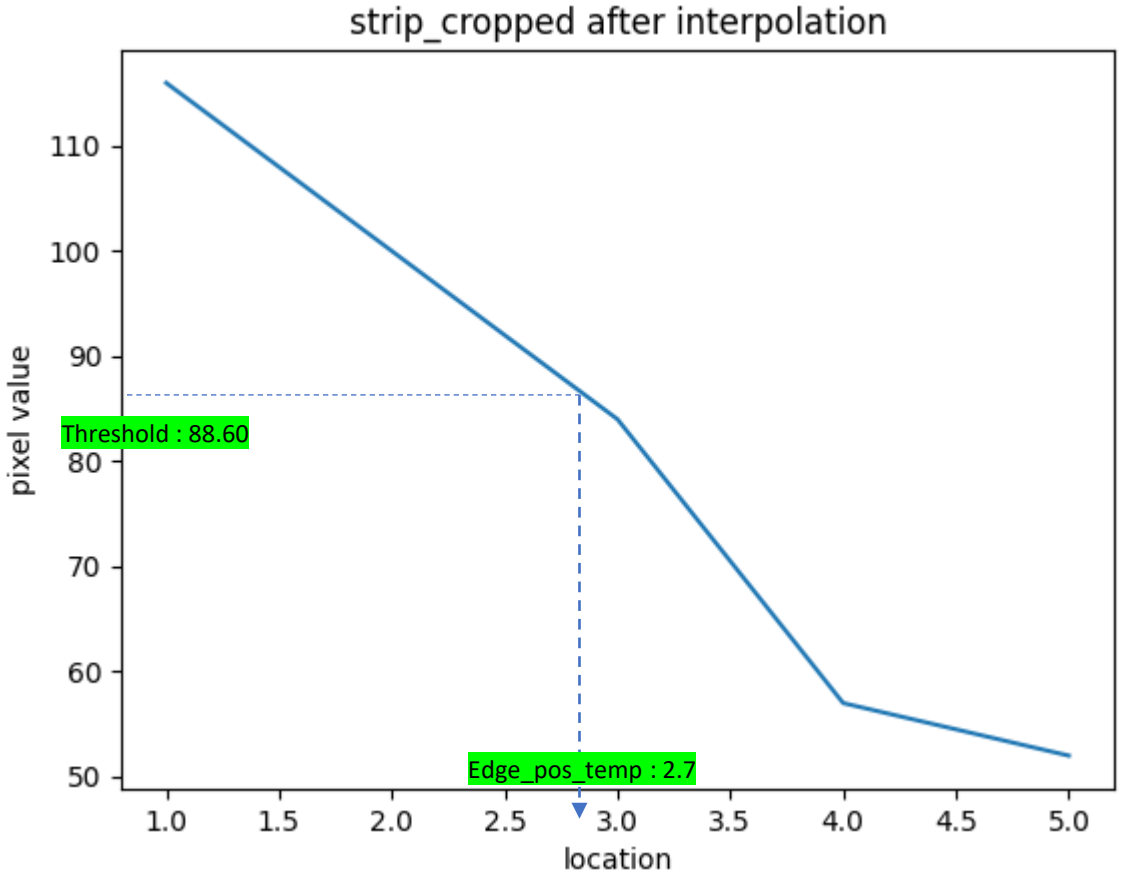
Smooth image

```
smooth_img[i, 0:(column-1)]
array([143., 127., 132., 132., 137., 127., 137., 132., 137., 127., 143.,
       127., 132., 127., 132., 127., 132., 127., 132., 127., 132., 121.,
       127., 132., 132., 132., 137., 127., 132., 132., 132., 121., 127.,
       121., 121., 127., 132., 121., 116., 116., 116., 111., 111., 100.,
        79.,  63.,  47.,  41.,  36.,  31.,  36.,  36.,  36.,  31.,  31.,
        25.,  31.,  25.,  31.,  31.,  31.,  36.,  31.,  25.,  36.,  31.,
        20.,  31.,  31.,  31.,  31.,  25.,  25.,  25.,  31.,  25.,  25.,
        31.])
```

```
smooth_img[i, 0:(column-1)]
array([143., 127., 132., 132., 137., 127., 137., 132., 137., 127., 143.,
       127., 132., 127., 132., 127., 132., 127., 132., 127., 132., 121.,
       127., 132., 132., 132., 137., 127., 132., 132., 132., 121., 127.,
       121., 121., 127., 132., 121., 116., 116., 116., 111., 111., 100.,
        79., 63., 47., 41., 36., 31., 36., 36., 36., 31., 31.,
        25., 31., 25., 31., 31., 31., 36., 31., 25., 36., 31.,
        20., 31., 31., 31., 31., 25., 25., 25., 31., 25., 25.,
        31.])
```

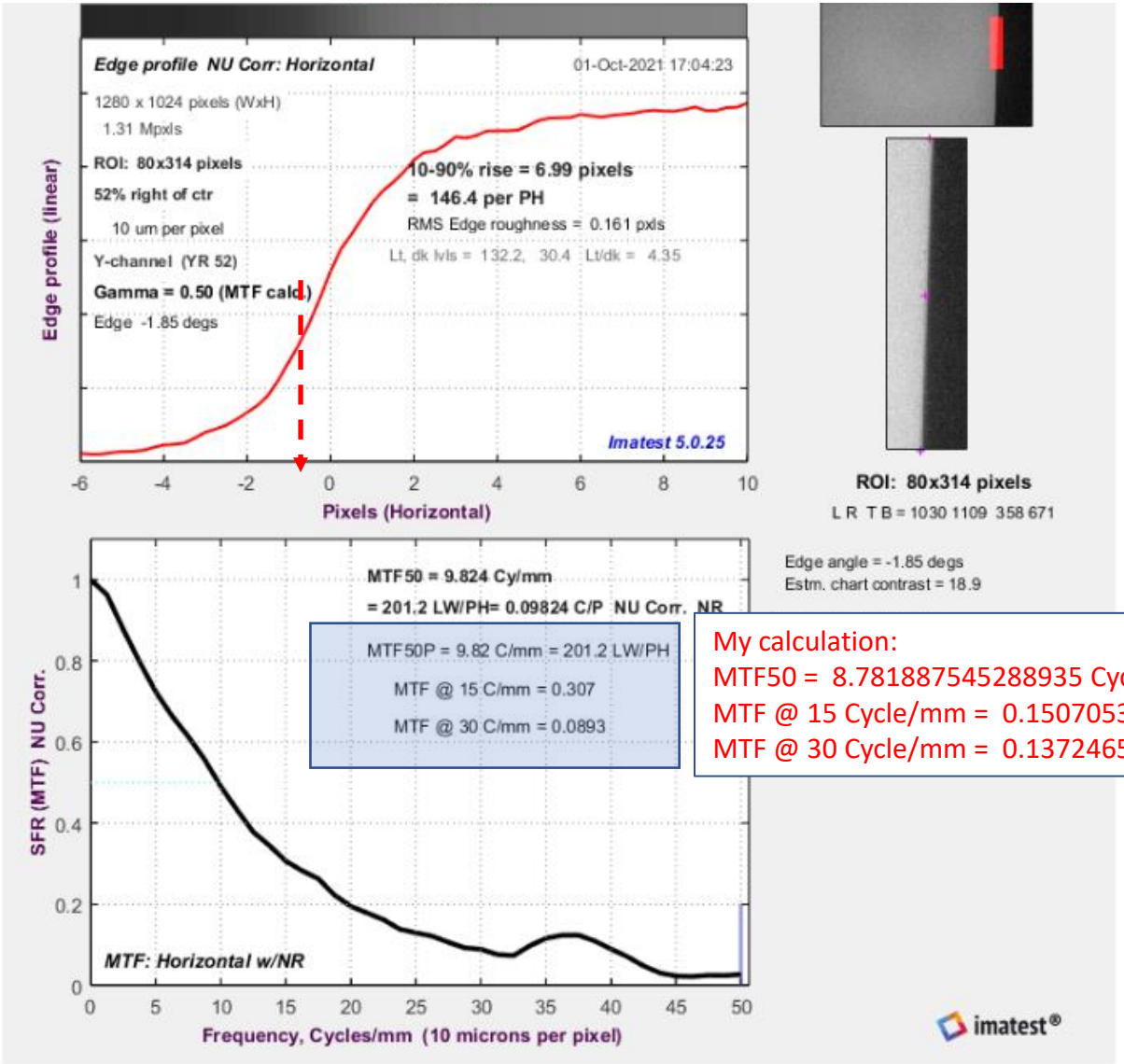


Smooth image[0:20,35:55]

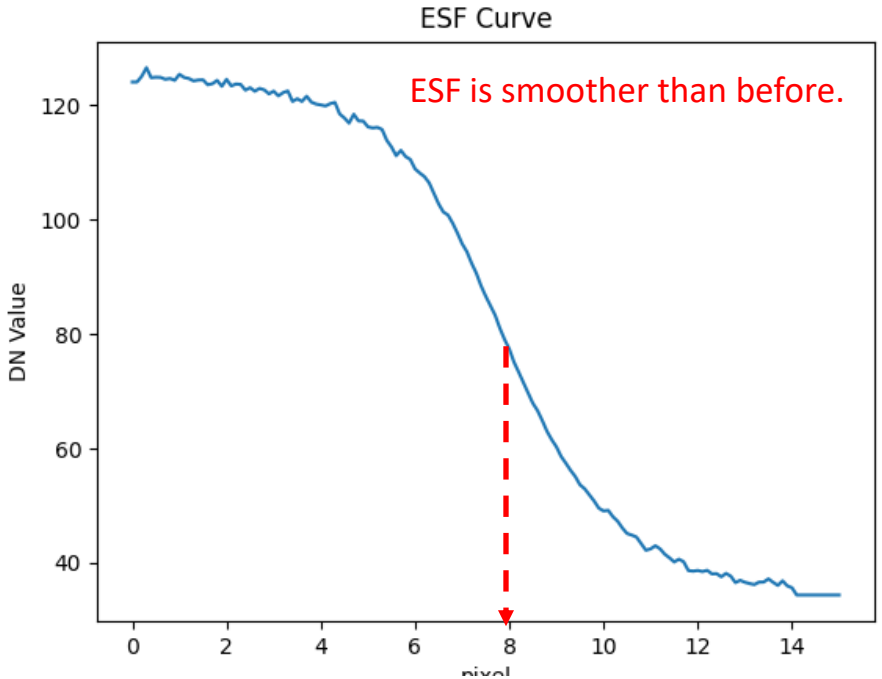


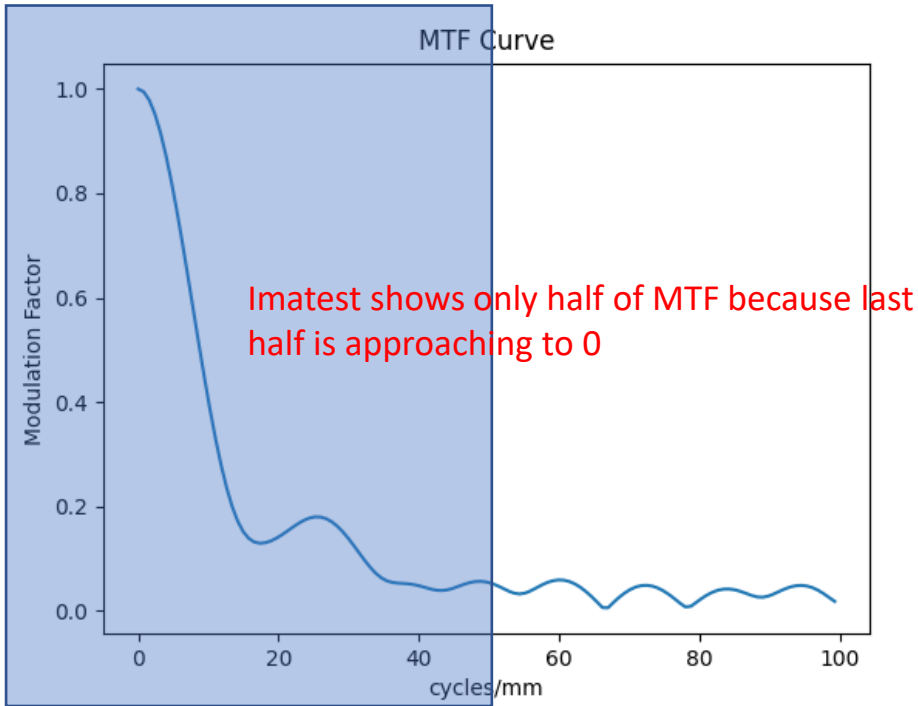
Future improvement: selecting x range of ESF

- We manually picked x range of the ESF so the center of the sloop is the center of x range.
- imatest selected x range based on the shape of curve. (don't know how it selected the range, but the right side is longer than the left side)

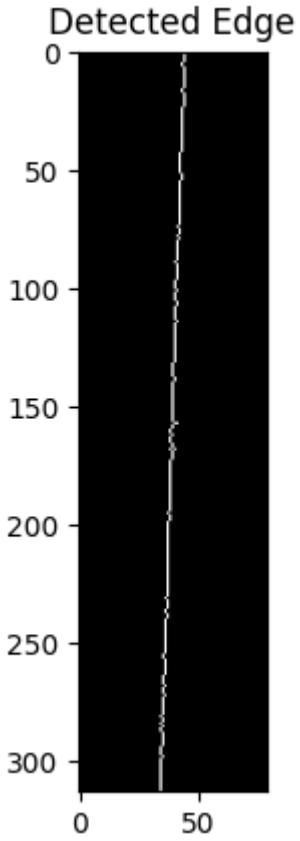


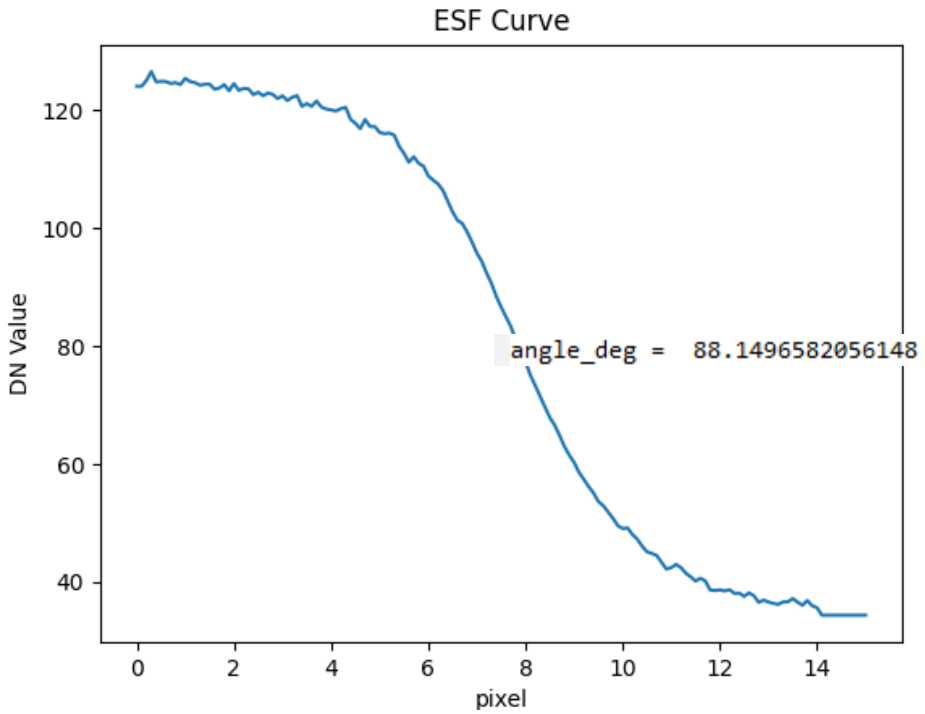
My calculation:
MTF50 = 8.781887545288935 Cycle/mm
MTF @ 15 Cycle/mm = 0.15070533934032174
MTF @ 30 Cycle/mm = 0.13724653248689064

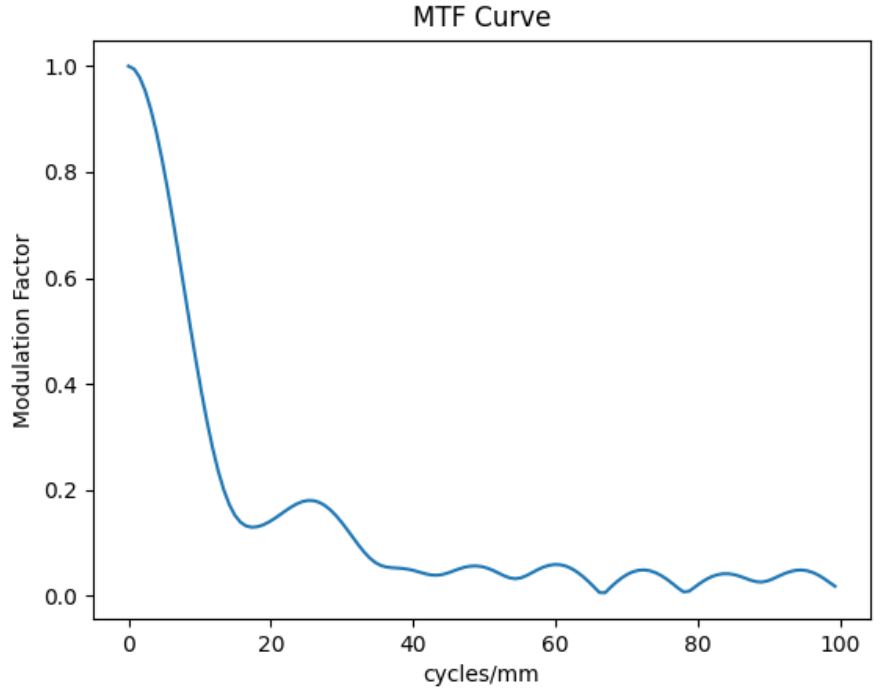




Result of MTF measurement








```
angle_deg =  88.1496582056148
MTF50 =  8.781887545288935 Cycle/mm
MTF @ 15 Cycle/mm =  0.15070533934032174
MTF @ 30 Cycle/mm =  0.13724653248689064
```