The parameters for reconstruction of the microtubule:

```
a_num=3;

lambda=660;
psize=13000/(100*1.5);
NA=1.49;
```

Uncomment the following code to obtain a better reconstruction result (line 79, the pre-deconvolution)

```
%     noiseimage(:,:,ii,jj)=deconvlucy(noiseimage(:,:,ii,jj),ipsfde,3);
```
and replace (line 302)

```
reconstructed_im=deconvlucy(reconstructed_im,psf_n,4);
```
with

```
reconstructed_im=deconvlucy(reconstructed_im,psf_nb,4);
```

Figure 1 shows the Phase only correlation results using three different kinds of phase estimation method for one pattern orientation. Pre-deconvolution mentioned above applied. The center in the result using auto-correlation method shows a high value, which denotes the estimated phases are inaccurate.
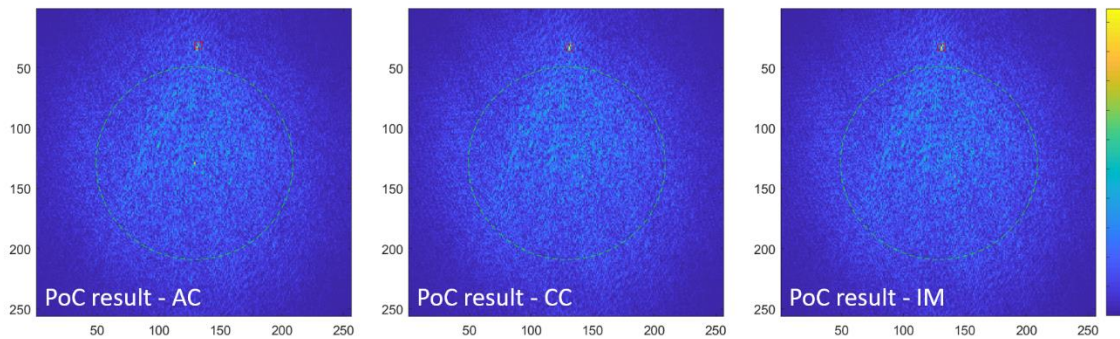

Fig. 1. The phase-only correlation results between the demodulated high-frequency component and the base-band component (which is also detectable in conventional optical microscopy) using different types of phase estimation algorithms. The wavelength used in this figure is 660 nm. Pre-deconvolution method applied. Abbreviation: AC, auto-correlation method; CC, cross-correlation method; IM, inverse matrix based method.

Without the pre-deconvolution step, the phase errors in the autocorrelation result get much more severe as illustrated in Fig. 2.
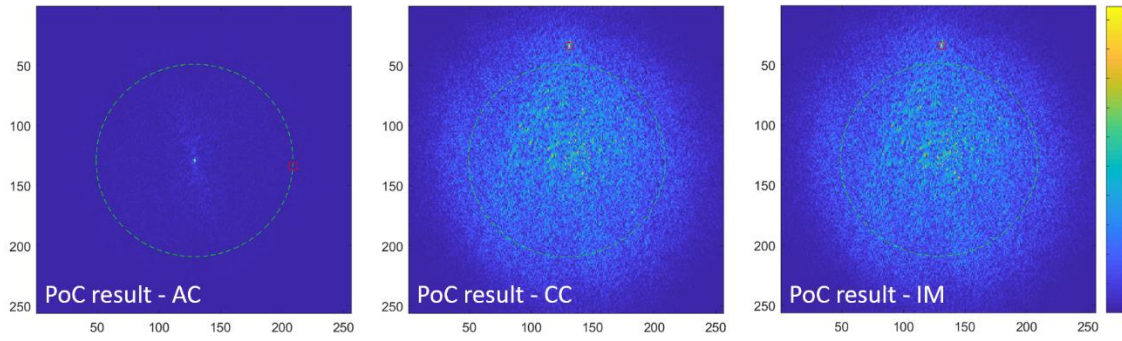
Fig. 2. The phase-only correlation results between the demodulated high-frequency component and the base-band component using different methods (without pre-deconvolution). The wavelength used in this figure is 660 nm. Abbreviation: AC, auto-correlation method; CC, cross-correlation method; IM, inverse matrix based method.

To demonstrate the robustness of these three phase estimation method, the wavelength is changed to 600 nm deliberately (the noise increased in this case). Figure 3 shows how these three types of algorithms work under this situation. It can be noticed that the center of the PoC result using cross-correlation shows a high value, while the inverse matrix method still provides a good estimation of the phases.
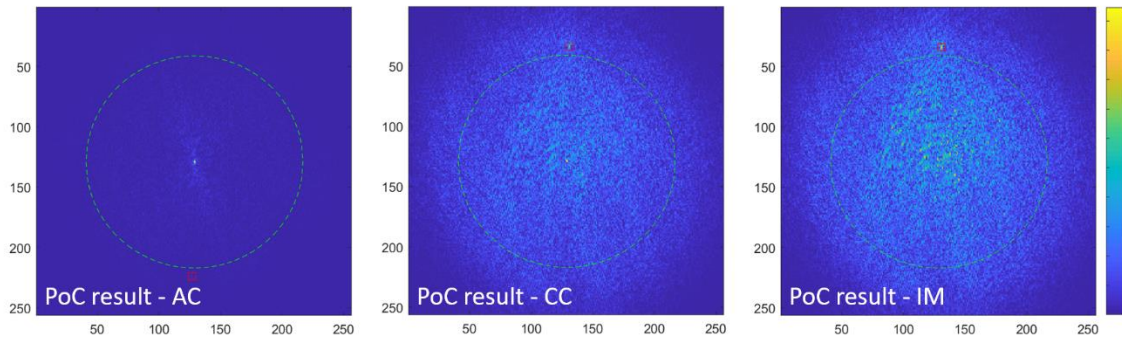

Fig. 3. The phase-only correlation results between the demodulated high-frequency component and the base-band component using different methods (without pre-deconvolution). The wavelength used in this figure is 600 nm. Abbreviation: AC, auto-correlation method; CC, cross-correlation method; IM, inverse matrix based method.

In the case when the wavelength is changed, the inverse matrix method provides a reliable phase estimation regardless of the pre-deconvolution step. While both the auto-correlation and cross-correlation methods fail without a pre-deconvolution step. (You can try it yourself and see the correlation result in each case)