

Exercise 1

1. For high u the envelope function tends to zero, as such the phase correlation transfer function also tends to zero regardless of Δf .
2. A zero crossing means that there is no phase contrast at these frequencies, such that there is no phase contrast image formed at these frequencies.
3. A defocus of zero ($\Delta f = 0$) would have no zero crossing thus allowing for the capture of information at all frequencies. The magnitude of phase contrast is low but with a CCD camera this should be no issue.
4. Increasing the tension of the electrons increases the width of the envelope function, allowing for a wider range of frequencies to be recorded. Changing C_s to be larger increases the amount of zero crossings at high- u .
5. Something like $\Delta f = -86$ would be best since it almost has a zero-crossing at $u = 3$ $[nm^{-1}]$ such that there is still information here but all other zero-crossings are pushed further to the high- u regime. This way there is good phase contrast up to $u \cong 5$ nm^{-1} .