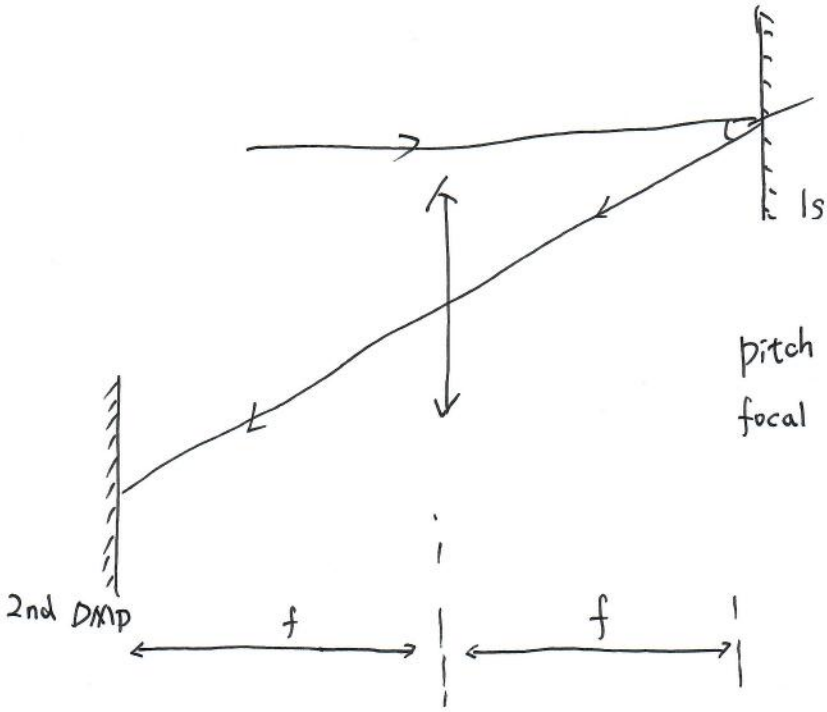
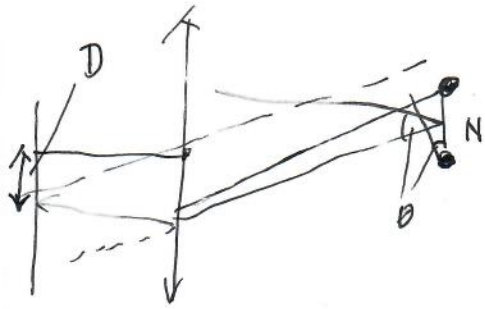


① decide the frequency plane size S(corresponding to 2D discrete FFT calculation) from optical calculation (ignore 24°, using small angle approximation)



Double slits experiment:

$$\theta = \frac{\lambda}{\text{Pitch} \times N}$$

for this frequency of double slit, N pixels gap the corresponding frequency location in frequency plane is D,

$$D = \theta \cdot f = \frac{\lambda \cdot f}{\text{Pitch} \times N}$$

$D = M(\text{pixel}) \times \text{pitch}$

$$M = \frac{\lambda \cdot f}{\text{Pitch}^2 \times N}$$

for $N = 1$

$M = 2768.6$ pixel

Verified in experiment

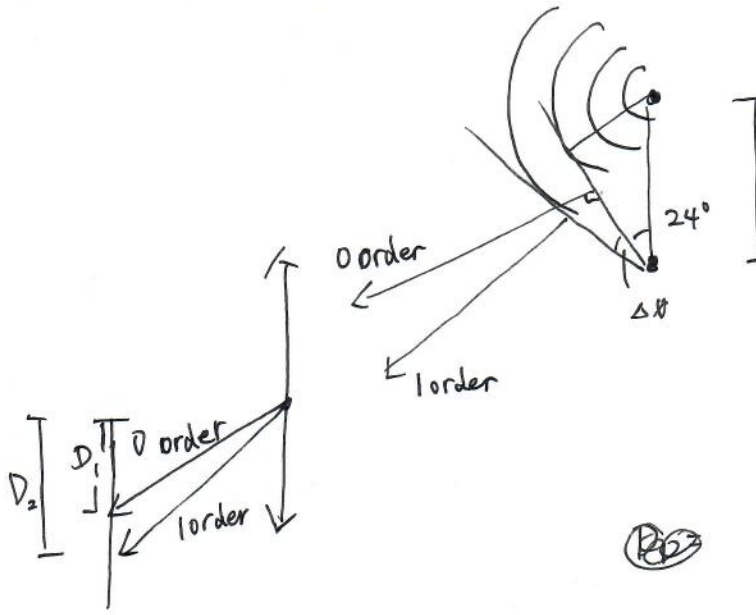
based on 2D discrete FFT, the M is $\frac{S}{N}$

$$\Rightarrow \frac{\lambda \cdot f}{\text{Pitch}^2 \times N} \rightarrow \frac{S}{N}$$

$S = 2768.6$ pixels

$\Rightarrow$ We should use 5537 pixel $\times$ 5537 pixel for 2D FFT

(2) 24° correction



$$\Delta\theta^{\circ} \approx \frac{\lambda}{B \cdot \cos 24^{\circ}} \approx \frac{0.09}{N} \leq 0.09 \text{ rad} \sim 5.16^{\circ}$$

$$D_1 = f \cdot \tan 24^{\circ}$$

$$D_2 = f \cdot \tan(24^{\circ} + \Delta\theta)$$

The same $D_3 = f \cdot \tan(24^{\circ} - \Delta\theta)$ the 1st order in other direction

$$\Delta D_{21}^{\circ} = f(\tan(24^{\circ}+\Delta\theta) - \tan 24^{\circ})$$

$$\Delta D_{31} = f(\tan 24^{\circ} - \tan(24^{\circ}-\Delta\theta))$$

Comparing with small angle approximation

$$\Delta D_{21}^{\circ} = \Delta D_{31}^{\circ} = f \cdot \Delta\theta^{\circ}$$

$$\Delta\theta^{\circ} = \frac{\lambda}{B} = 0.0837/N$$

$$\frac{\Delta D_{21}}{\Delta D_{21}^{\circ}} = 1.159$$

$$\frac{\Delta D_{31}}{\Delta D_{31}^{\circ}} = 1.087$$

We may correct it or not

for vertical, it keeps the same