This is especially because the Fourier Transform of noise, i.e. $N(u,v)$ (an unknown quantity), may be greater than $F(u,v)$ for high u and v.

2D Image

Let gradient on X & Y directions are g_x & g_y. and Corresponding gradient filter be $\begin{bmatrix} +a & 0 & -a \\ +b & 0 & -b \\ +c & 0 & -c \end{bmatrix}$ & $\begin{bmatrix} +a & +b & +c \\ 0 & 0 & 0 \\ -a & -b & -c \end{bmatrix}$ & f be the original image, then

$$g_x = \begin{bmatrix} +a & 0 & -a \\ +b & 0 & -b \\ +c & 0 & -c \end{bmatrix} * f \quad \text{\&} \quad - (1)$$

$$g_y = \begin{bmatrix} +a & +b & +c \\ 0 & 0 & 0 \\ -a & -b & -c \end{bmatrix} * f \quad - (2)$$

Taking F.T. of (1) & (2) we get

$$G_x = \mathcal{F}\left(\begin{bmatrix} +a & 0 & -a \\ +b & 0 & -b \\ +c & 0 & -c \end{bmatrix}\right) \cdot F$$

$$G_y = \mathcal{F}\left(\begin{bmatrix} +a & +b & +c \\ 0 & 0 & 0 \\ -a & -b & -c \end{bmatrix}\right) \cdot F$$

~~If we c~~ Now, DFT is given by

$$F(u,v) = \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} f(x,y)\, e^{-j2\pi\left(\frac{ux}{M} + \frac{vy}{N}\right)}$$

Now, DC component is given by $F(0,0)$ (which is the value of the transform at the origin of the frequency domain.