Were the last Fourier transform to have been done optically, rather than on the computer, the phase of expression (2) would have been displayed on a light valve a Fourier lens placed in the beam and the bright center spot masked out.

2. Phase encoding through Nyquist frequency encoding

This starts with a somewhat different expression as a starting point.

$$e^{i(S_{nm}(-1)^{(n+m)}+\phi_{nm})} \tag{6}$$

In this the quantity S_{nm} is modulated with the maximum frequency possible on the raster. The finest checker pattern either 1 or -1 vis. $(-1)^{(n+m)}$. The phase $[\phi_{nm}]$ is the phase of expression (2). We simply apply Euler's equation

$$e^{i(S_{nm}(-1)^{(n+m)}+\phi_{nm})} = \cos(S_{nm})e^{i\phi_{nm}} + (-1)^{(n+m)}\sin(S_{nm})e^{i\phi_{nm}} \tag{7}$$

The cos term looks good especially if we set $S_{nm} = \cos^{-1}(R_{nm})$.

$$e^{i(S_{nm}(-1)^{(n+m)}+\phi_{nm})} = R_{nm}e^{i\phi_{nm}} + (-1)^{(n+m)}\sqrt{1-R_{nm}^2}e^{i\phi_{nm}} \tag{8}$$

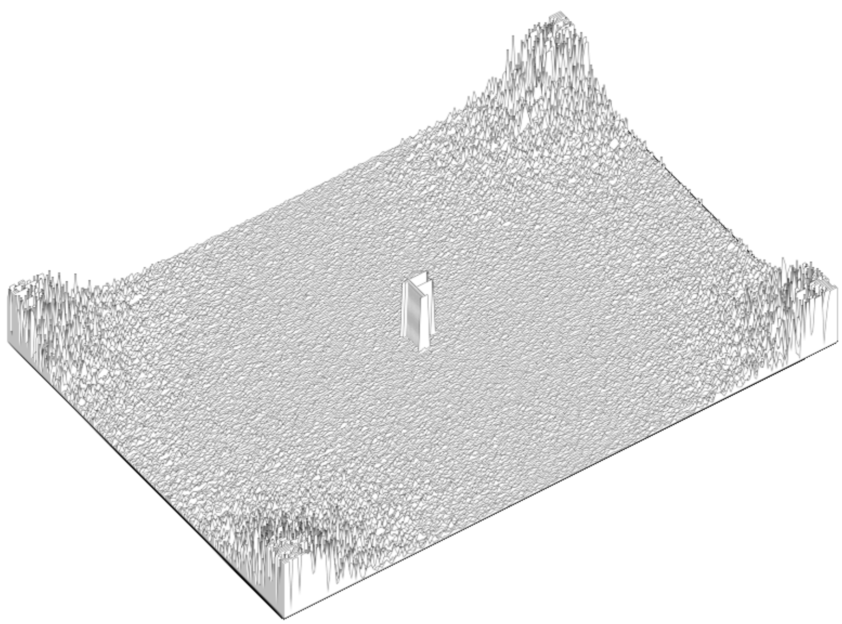

Figure 2. Constructed using method above.

Since the phase is added separately after they coded amplitude, the entire image including the noise is determined by the position of the image. So if we were to choose to displace the image to the north west the noise would move along with it. If the image is very large you clearly are going to have overlap with the noise.