W18HOSTEPS

The object y has a complicated shape. Its FT is the hologram c. It may be produced in the focal plane of a lens, using parallel light.

The illumination of the hologram with parallel light will reproduce the object, that is the FT(inverse) of the FT, called here cc.

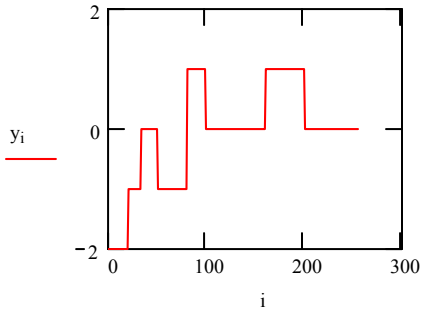
We want to study the reproduced object when the information in the hologram is only partly used, that is we multiply cc with a filter f.
We show separately f and the FT of the product of f and cc.

The width of the filter f may be changed by using various values for "a" and "b", corresponding to changing the size of the hologram.

The Object $i := 0, 1 .. 255$

$A_1 := 33 \quad A_2 := 80 \quad A_3 := 80 \quad A_4 := 50 \quad A_5 := 20 \quad A_6 := 99 \quad A_7 := 160$

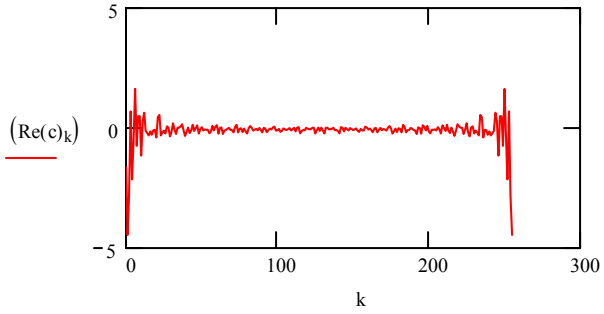
$$y_i := \sum_{n=1}^{3} \left(-\Phi\left(A_n - i\right)\right) + \sum_{n=4}^{8} \left[\Phi\left(A_n - i\right)\cdot(-1)^n\right] \qquad A_8 := 200$$



The hologram

$c := \text{cfft}(y) \qquad N := \text{last}(c) \qquad N = 255$

$k := 0 .. 255 \mid \equiv 0 .. 255$



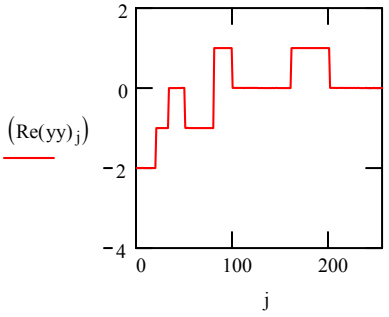
The FTof the hologram

The FT of the FT(hologram)

$cc_k := c_k$

$yy := icfft(cc)$

$N := last(cc) \qquad N = 255 \qquad j := 0 .. 255$

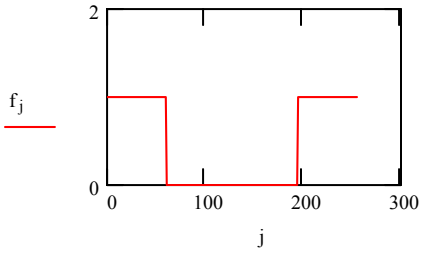


The filter

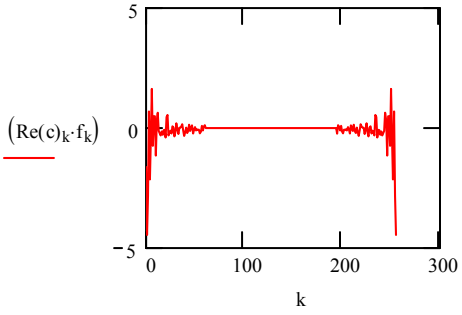
$f_j := \Phi(a - j) + \Phi(j - 255 + b)$

$a \equiv 60$

$b \equiv 60$



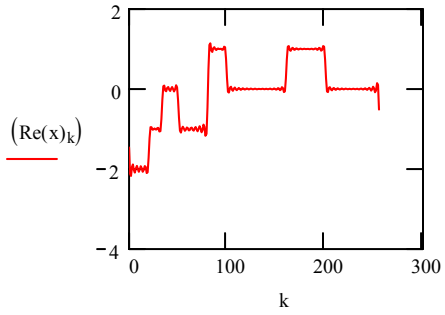
The product: hologram x filter



The FT (inverse) of the changed hologram (hologram x filter), similar to the object

$ccc_k := c_k \cdot f_k$ $x := icfft(ccc)$ $N := last(ccc)$ $N = 255$

$k := 0 .. 255$



For comparison: The object.