

**5. Image restoration (the test image book\_cover.jpg can be found at ftp://ftp.cs.sjtu.edu.cn:990/lu-ht/DIP/images)**

Suppose a blurring degradation function as

$$H(u, v) = \frac{T}{\pi(ua + vb)} \sin[\pi(ua + vb)] e^{-j\pi(ua + vb)} \quad (1)$$

- (a) Implement a blurring filter using Eq. (1).
- (b) Blur the test image book\_cover.jpg using parameters  $a=b=0.1$  and  $T = 1$ .
- (c) Add Gaussian noise of 0 mean and variance of 650 to the blurred image.
- (d) Restore the blurred image and the blurred noisy image using the inverse filter, Wiener filter, respectively.
- (e) Add Gaussian noise of 0 and different variances to the blurred image and repeat (d), investigate the performance of the Wiener filter.