In recent times, considerable attention was focused on the computation of the eigenvalues and eigenfunctions of the Finite (truncated) Fourier Transform (FFT). An incentive to that a series of papers by Slepian and his collaborators at Bell labs was. The latest results published by Walter and Shen on sampling with the prolate spheroidal functions — the 1D FFT eigenfunctions — will necessary produce a new wave of interest. Thus the possibility to extend their approach to the 2D case looks very promising and important in image processing.

The associated eigenvalues are also important in many practical applications, in particular, in order to estimate the accuracy loss caused by truncation of the Fourier transform of a two-dimensional signal.

Of special importance is the property of the 1D– and 2D FFT eigenvalues that starting from a certain index, they all are zero up to a very high accuracy. The number of ‘non-zero’ eigenvalues is often called the degree of freedom of the related Paley–Winer space: only ‘non-zero’ eigenfunctions and their linear combinations may be transformed from the spatial to the Fourier space and back without significant information loss.

In [1] an efficient, simple and robust numerical technique for computation of 1D FFT eigenfunctions and various functionals of them was discussed. The approach appears to be universal, slightly modified it might be exploited in various similar computations. The presented modification serves to compute 2D FFT eigenvalues and eigenfunctions.