

ComputerLab: Fourier Transform

This computer lab addresses the implementation of the Fourier Transform (analysis and synthesis), and some signal processing tasks (filtering, denoising).

This computer lab employs Matlab. However you can use any other language. You will need a Fourier Transform for 1D signals and 2D signals (images).

Part 1 -- 1D signal

Create a script called tp1.m that contains all instructions described below.

- Create $x[n]$ a cosinus function
- Visualize
- Compute the discrete Fourier Transform through a FFT program
- Visualize real and imaginary part

Do you observe what you expected?

Try now with a sinus function, a shifted cosinus, a constant function, vary the frequency, and a noise (with zero mean)...

Part 2 -- denoising

Create a script called tp2.m

- Create a signal composed of a cosinus function (choose shift and frequency) and add noise (realizations of a centered random variable)
- Visualize
- Compute the discrete Fourier Transform through a FFT program
- Visualize real and imaginary part
- What do you propose to do in the Fourier domain to remove the noise?