Questions – Spectral Estimation

1. What is so fast about the **Fast Fourier Transform** (FFT) compared to the complete Digital Fourier Transform (DFT)? What is the speed up for a vector on length 4048?

2. What are the **most important** processing steps **before** estimating a spectrum?

3. Explain the concept of **zero-padding** with the sampling theorem!

4. What is **spectral leakage**? How can it be avoided? Under what conditions is there no spectral leakage?

5. Find definitions of "**stationary signals**" and "**transient signals**", give examples in seismology.

6. Explain the concept of **power spectral density**, what is the key motivation for its derivation?

7. What is **time-frequency analysis**? Give a few examples from geophysics, in which this signal processing tool might be useful!