Tutorial

1. A signal of the duration of 1 second is composed of 2 linear chirp components, the first chirp starts at 0 s and lasts 1 second, it has an initial frequency of 200 Hz for s = 0 s, and 1kHz for s =1 s; the second chirp also starts at 0 s and lasts 1 second, it has an initial frequency of 400 Hz, and a final frequency of 4 kHz.
   1. Sketch the time frequency distribution of the signal.
   2. Sketch the Wigner Ville Distribution of the signal.
   3. What would happen if the Smoothed Pseudo Wigner Ville distribution is used instead of the Wigner Ville distribution?
   4. Assuming minimum Nyquist sampling, what is the minimum window size (in samples) to be used in a spectrogram in order to be able to discriminate in frequency the two chirps?
2. An audio signal containing some speech is sampled at 44,100 Hz and is analysed using a spectrogram.
   1. what would be the minimum window size to be able to discriminate formants

separated 50Hz?

* 1. What would be the maximum window size needed to be able to observe a pitch period of 5 ms ?