Demo 17: Complex Amplitude Modulation Exercises

DSP Lab (EE 4163 / EL 6183)

Fall 2017

In a previous lab we used amplitude modulation (AM) to affect a speech signal. This method computes the output signal as

$$y(t) = x(t) \cos(2\pi f_1 t). \tag{1}$$

This AM method can lead the spectrum of the signal x to overlap itself. To shift a speech signal to a higher frequency without causing spectral overlapping as in Figure 1, we can use complex AM. This method is shown in the Matlab demo programs.

1 Exercises

1. Using an input wave file of your choice, use Matlab to implement complex AM (like in the Matlab demo file).

2. Use Python to obtain the same result as in Matlab using the same input wave file as in the preceding part. Your Python output should be the same as your Matlab output.

3. **Real-time complex AM.** Implement real-time complex AM in Python with PyAudio. Your program should take the microphone signal as input and produce an output audio signal (on speakers or headphones). Compare the sound with real AM in equation (1) which was implemented earlier in the course. It is recommended to use headphones or earbuds to compare the audio of the two methods.   SUBMIT
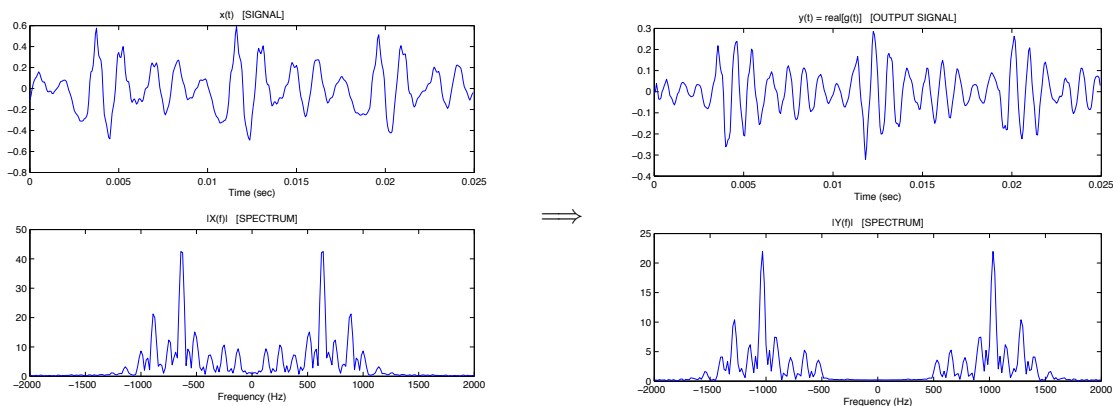

Figure 1: Complex AM

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