

ECE 2045: Statistical Signal Processing

Lab 2: Spectral Estimation Method

As an example, consider the following 1001-element signal x_n , which consists of two sinusoids plus noise:

- `randn('state',0);`
- `fs = 1000;` % Sampling frequency
- `t = (0:fs)/fs;` % One second worth of samples
- `A = [1 2];` % Sinusoid amplitudes (row vector)
- `f = [150;140];` % Sinusoid frequencies (column vector)
- `xn = A*sin(2*pi*f*t) + 0.1*randn(size(t));`

The periodogram estimate of the PSD can be computed by creating a periodogram object

- `Hs = spectrum.periodogram('Hamming');`

and a plot of the estimate can be displayed with the `psd` method:

- `psd(Hs,xn,'Fs',fs,'NFFT',1024,'SpectrumType','twosided')`

The average power can be computed by approximating the integral with the following sum:

- `[Pxx,F] = psd(Hs,xn,fs,'twosided');`
- `Pow = (fs/length(Pxx)) * sum(Pxx)`

You can also compute the average power from the one-sided PSD estimate:

- `[Pxxo,F] = psd(Hs,xn,fs,'onesided');`
- `Pow = (fs/(2*length(Pxxo))) * sum(Pxxo)`
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