Spectral Analysis using Matlab

CPE 381 Fundamentals of Signals and Systems for Computer Engineers

Dr. Emil Jovanov

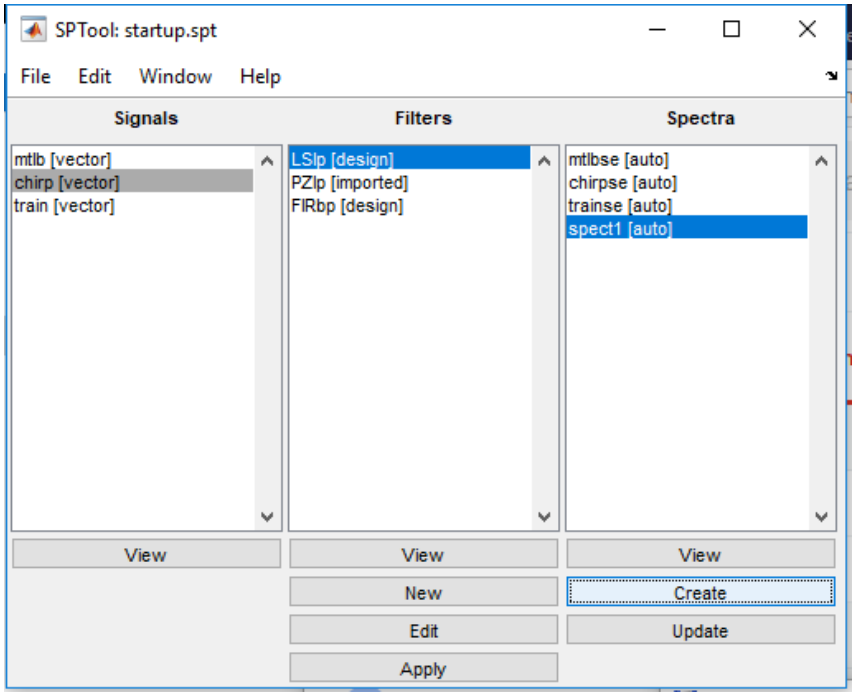
Why do we need spectral analysis?

- Analysis of real signals
  - Elimination of noise
- Analysis of effectiveness of filtering
- Real-time applications
  - Speech recognition
  - Data communication

Spectral Analysis in Matlab: sptool#1

- Integrated signal processing tool in Matlab
  - sptool
- Import signal
  - Import signal in Matlab from your WAV file
  - Import signal to sptool
    - File/Import
    - Define sampling frequency
    - Don’t forget to import a single array! For stereo signals select only one channel: for example, if your signal is stereo y(535231,2) select only one channel in Matlab as

      y1=y(:,1);
- Create spectrum of the imported signal



sptool #2

- Spectral analysis
  - Click on your signal on the list of signals in sptool
  - Click on “Create” new spectrum (see figure below)
  - Use default method and window, or try alternative settings
  - Use larger length of FFT/Nwind and use Nwind/2 overlap
  - Click on “Apply”
  - Copy figure and paste it in your report
- Repeat process for
  - Original signal
  - Modified signal with sine waves
  - Filtered signal
- Discuss the results