Contents

## Test script for PSO on the linear chirp matched filtering problem

Generate data realization for signal and data parameters specified in the order below. Number of samples in data; Sampling frequency; SNR (signal amplitude); f0; f1; initial phase; time of arrival; signal length.

```
nSamples = 2048;
fs = 2048;
sigLen = 0.25;
f0 = 384;%Hz
f1 = 39;%Hz^2
snr = 20;
[dataVec,timeVec]=genlinchrpwgndata(nSamples,fs,snr,f0,f1,pi/3.3,0.3,sigLen);
```

Spectrogram of data realization

```
[S,F,T]=spectrogram(dataVec,64,63,[],2048);
imagesc(T,F,abs(S)); axis xy;
snapnow;
```
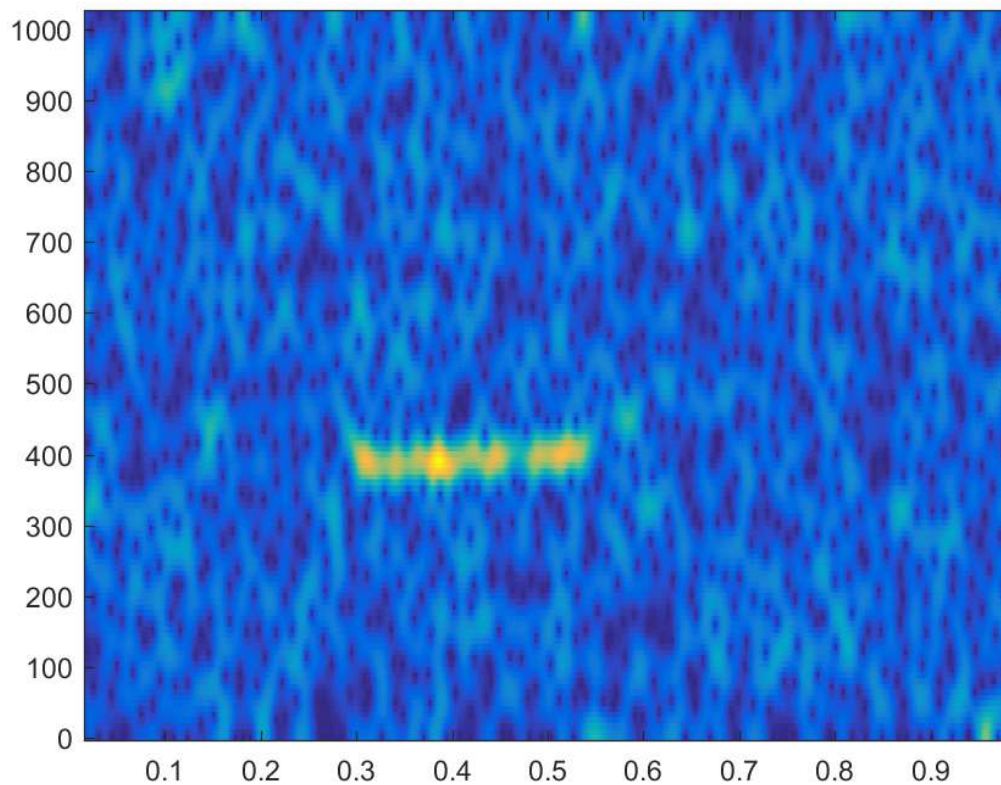
Run PSO

The fitness function called is LINCHIRPMFFITFUNC. The FFT of the data realization is passed through the fitness function input parameter structure (2nd input argument). Make sure that the search range includes the signal parameters as specified in the generation of the data realization. The first search parameter is f0 and the second is f1.

```
fftData = fft(dataVec);
ffparams = struct('rmin',[50,5],...
                  'rmax',[500,50],...
                  'fftData',fftData,...
                  'timeVec',timeVec,...
                  'fs',fs,...
                  'sigLen',sigLen);
```

Fitness function handle.

```
fitFuncHandle = @(x) linchirpmffitfunc(x,ffparams);
```

Call PSO.

```
psoOut = ldacpso(fitFuncHandle,2);
```

Estimated parameters

Best standardized and real coordinates found.

```matlab
stdCoord = psoOut.bestLocation;
[~,realCoord] = fitFuncHandle(stdCoord);
fprintf('Estimated f0=%f; Real f0=%f\n',realCoord(1),f0);
fprintf('Estimated f1=%f; Real f1=%f\n',realCoord(2),f1);
```

```
Estimated f0=383.426323; Real f0=384.000000
Estimated f1=41.384530; Real f1=39.000000
```