Instructions for Hooke_Jeeves_Student3 method of FM signal analysis

Original LabWindows CVI version by Gregory Kyriazis, InMETRO

Citation:
Kyriazis G. A., “Estimating parameters of complex modulated signals from prior information about their arbitrary waveform components,” IEEE Trans. Instrum. Meas., v. 62, no. 6, pp. 1681-1686, June 2013.

Citation:
Kyriazis G. A., “A Cartesian method to improve the results and save computation time in Bayesian signal analysis,” in Advanced Mathematical and Computational Tools in Metrology and Testing X (AMCTM X), Series on Advances in Mathematics for Applied Sciences, vol. 86, F. Pavese; W. Bremser; A.G. Chunovkina; N. Fischer; A.B. Forbes (eds.), World Scientific, 2015, pp. 229-240.

Ported to MATLAB by Allen R Goldstein, NIST

First use: Test script Hooke_Jeeves_Student3.m

1. Open Matlab and navigate to the working folder F:\Projects\SpectralToolkit\Sandbox\FM_Kyrizis\Matlab
2. Add the folder to the MATLAB path is not already added
3. Run the script: Hooke_Jeeves_Student3.m which contains the following function calls

```
a.  HJS = FM_HJS_Class()   % Instantiate the class
b.  HJS.configure()        % Configure the properties
c.  HJS.mod_Freq_NLS()     % NLS analysis of modulating signal Frequency
d.  HJS.mod_Amp_NLS()      % Modulating signal Amplitude and Phase from NLS
e.  HJS.plot('NLS')        % Plots the NLS analysis results
f.  HJS.Freq_BSA()         % BSA analysis of modulated signal
g.  HJS.Ampl_BSA()         % Modulated signal amplitudes and phase from BSA
h.  HJS.plot('BSA')        % Plots the BSA analysis results
```

Read the FM_HJS class documentation

The class is fully documented. On the MATLAB command line, type “doc FM_HJS_Class”.

The documentation will open. In the documentation are links for all properties and methods of the class. Click on each of those for documentation of the property or method.

For example, the class constructor accepts a set of name,value pair arguments. If the argument is not included in the call to the constructor, then the default settings will apply: in the MATLAB documentation on the class, click on the Constructor Summary FM_HJS_Class to see full documentation of the arguments as follows:

The constructor accepts name,value pair arguments. If the argument is not included in the constructor call the default value will ne used. the arguments and their default values are shown here:

Example: FM_HJS_Class(Name1,Value1,Name2,Value2,...NameN,ValueN,)

Argument Name , type , default value % comment
'Name' , char , 'default FM_HJS' %
'SampleRate' , double, 1/.00006520 %
'Duration' , double, 8000/defaultSampleRate % signal duration in seconds
'SignalParams , 15 x 1 array of doubles, [1,49.9876543210,0,0,0,0,4.9876543210,5,0,0,0,0,0,0,0]' % See the SignalParams property description

```
'PhaseNoiseParams', struct, struct('NoiseUniformLow',0,'NoiseUniformHi',0,'NoiseGaussMean',0,'NoiseGaussSD',0.000001) %
'AmplNoiseParams' , struct, struct('NoiseUniformLow',0,'NoiseUniformHi',0,'NoiseGaussMean',0,'NoiseGaussSD',0.000001) %
'ModNoise'        , logical, 'true'              % if true, phase noise will be added to the simulated modulating signal
'SigNoise'        , logical, 'true'              % if true, Amplitude noise will be added to the simulated modulated signal
'NumHarm'         , 3                            % Number of harmonics to use during NLS and BSA analysis
'GenModData'      , []                           % Uploaded modulating signal.  If empty, a simulated signal will be created
'GenData'         , []                           % Uploaded modulated signal.  If empty, a simulated signal will be created
'Verbose'         , 'true                        % If true, computed values will be displayed in the console
```