

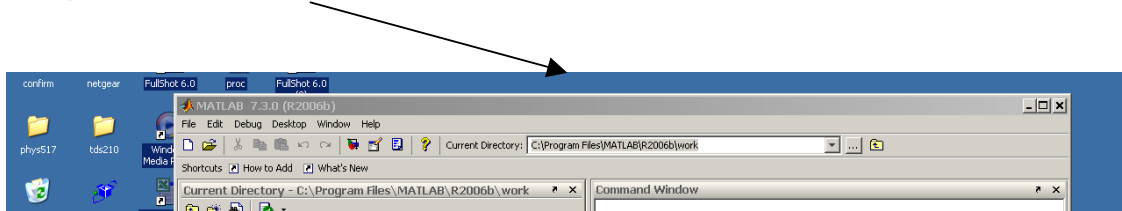
Frequency Sweep with Matlab

S. Durkin May 16, 2008

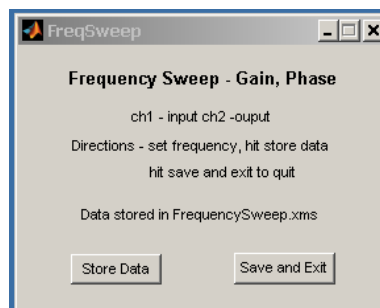
There are many circuits that one wants to plot gain and phase as a function of frequency (RC circuit, LRC circuit, CE Amplifier, OpAmps). This program performs fits of captured waveforms for channel 1 (input) and channel 2 (output) to calculate the amplitude ratio and phase for the two sine waves.

Running Matlab ScopeGui:

- 1) Run Matlab (*All Programs->MATLAB->R2006b->MATLAB R2006b*).
- 2) Using the desktop toolbar below change the current directory to c:\Matlab_TDS210 or c:\Matlab_TDS1002b.



- 3) At the Matlab command prompt type: FreqSweep. The following Gui should appear.



- 4) Set a frequency and hit the Store Data button. After the Store Data button turns green you can set another frequency and hit the Store Data button again. When the button turns green, plots of the programs fits to CH1 and CH2 waveforms will be displayed (data points in blue and fit curve in red). On rare occasions one of the two fits will be extremely poor. Note the data sample number and remove it from your data later on.
- 5) At any time you can save the data you have taken by hitting the Save and Exit button. You will be prompted for an Excel filename (choose a new name). Amplitude and phase plots for the data you have taken will pop up. At this point you can choose to Store some more data as in 4) above.

- 6) You should turn up the amplitude of your frequency generator before taking data. Shown in the graphic below is the excel file from the same setup at the same frequency where the data has been stored three separate time. One sees the frequency, amplitudes, phases, gain, and relative phase are all reproducible to about 0.2 %.

Excel File Format

	A	B	C	D	E	F	G	H	I	J	K
1	10080.58	2.616497	1.341669	-81.0947	-139.686	0.512773	58.59152				
2	10067.78	2.60135	1.337341	-81.1439	-139.64	0.514095	58.49572				
3	10064.87	2.598861	1.33564	-80.2322	-138.827	0.513933	58.59458				
4											
5											
6											
7											
8											
9											
10											

- Column A – Frequency (Hz)
- Column B – Amplitude Ch1 (Volts)
- Column C – Amplitude Ch2 (Volts)
- Column D – Phase Ch1 (Degrees)
- Column E – Phase Ch2 (Degrees)
- Column F – Gain (V_{out}/V_{in})
- Column G – Phase Difference Ch2-Ch1 (Degrees)