Lab Notebook: Fourier Methods

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Contents

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The Timeline:

- 7 Class sessions
- Read ch 6 & 15 for Signal to noise
- FM Com: ch 3, 5, 7, 18
- Acoustic vs. Fluxgate

Familiarizing with Equipment (Chapter 0-2) Equipment list:

- SR770 FFT Network Analyzer (main)
- Keysight 33500B Waveform Generator (Signal)
- Tektronix TDS 1012 (oscilloscope/scope)
- Teach Spin Fourier Methods Electronic Modules

Observations:

- Triangle wave & Square wave harmonics: [insert small table here]
- Sum of two sine waves(10 kHz and 20 kHz) can be easily identified in the frequency domain (SR770), but difficult to impossible in the oscilloscope (scope).
- Both 1 kHz vs 2

frequency duration 'uncertainty principle'

$$(\text{frequency resolution achievable}) \cdot (\text{acquisition time required}) \geq \text{a number}$$

Example: Given two frequencies, 50 Hz and 50.5 Hz
4ms acquisition time: 256 voltage samples per ms

Signal recovery from under noise

1 AM Radio Reception

2 The Fluxgate Magnometer