

Physics Demonstrations

February 2017

1. Standing waves on an elastic string
 - A. DC Power Supply
 - B. Elastic 1/8" Diameter – Sewing
 - C. Two Ring Stands plus Clamps
2. Reflected Wave Phase
 - A. Mini Slinky
 - B. String
3. Projection hardware for iPad/iPhone
4. Resonance in Closed Tube
 - A. 1/2" Copper tube – 10-15 length – plus End Cap
 - B. Activate "FFT Plot" App – Apple app store
 - C. Start FFT Plot
 - D. Blow over mouth of tube
 - E. Pause program
 - F. Measure resonant frequencies – $\frac{1}{4}\lambda$, $\frac{3}{4}\lambda$, $\frac{5}{4}\lambda$, etc.
5. Resonance in Open Tube
 - A. Remove End Cap
 - B. Reset FTT Plot
 - C. Blow over mouth of open tube
 - D. Pause program
 - E. Measure resonant frequencies – $\frac{1}{2}\lambda$, $\frac{2}{2}\lambda$, $\frac{3}{2}\lambda$, etc.
6. Resonance in a fixed string
 - A. Reset FTT Plot
 - B. Play open A or E string
 - C. Pause FTT Plot
 - D. Measure resonant frequencies - $\frac{1}{2}\lambda$, $\frac{2}{2}\lambda$, $\frac{3}{2}\lambda$, etc.
7. Harmonic in a fixed string
 - A. Reset FTT Plot
 - B. Play open A or E string
 - C. Pause FTT Plot
 - D. Measure resonant frequencies – $\frac{2}{2}\lambda$, $\frac{4}{2}\lambda$, $\frac{6}{2}\lambda$, etc.
8. Thin Film Interference
 - A. Thin Film Solution – 1 part Ivory Liquid, 2 Parts Glycerine, 3 Parts Water
 - B. PVC Parts – Base, Vertical Tube, Right Angle, Listerine Cap [large], Shower Ring
 - C. Illumination - Either
 - a. iPad App for Illumination – "Droid Light" or equivalent
 - b. High Intensity Flashlight + Ring Stand + Clamp
 - D. iPhone 7 or equivalent + mounting hardware [bicycle mount]
 - E. Dip ring in soap solution – set in mount
 - F. Reflect diffuse white light on film
 - G. Mount camera facing film
 - H. Turn on iPhone camera

9. Sound Interference & Beats

- A. Acquire "SigGen" Dual Channel Audio Oscillator iPhone App [or equivalent]
- B. Turn on the SigGen Audio Oscillator
- C. First set the Left Channel to 800Hz and the Right Channel to 802Hz
- D. Note the clearly audible Beat Frequency of 2Hz
- E. Set SigGen to 800Hz on Left Channel and 700Hz on Right Channel
- F. Make sure both signals have the same amplitude.
- G. Do NOT overmodulate the sound intensity – You do not want to generate excessive noise.
- H. Make sure each channel is on sine curve.
- I. Acquire "Oscilloscope" by ONYX Apps [or equivalent]
- J. Turn on the Oscilloscope program
- K. Pinch the iPad screen down to a time scale of about 5-6 ms
- L. Click on "TOOLS" and toggle through the TRIGGER options until you can stop the interference signal.
- M. Play around on your own!

Jim Kovalcin – Private Physics Tutor and Instructor

JimTHX@comcast.net