

Transverse Standing Waves

Physics 1320

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September 2002 (*fixed error in plot relation*)

Procedure

- Attach the mass hanger to the free end of the string over the pulley. Make sure that the string is parallel to the lab bench.
- Turn on the tuning fork vibrator and add some mass to the hanger.
Do NOT supply more than 7 volts DC to the vibrator!
- You should be able to see six or seven normal modes of vibration. The fundamental requires about 1.5 kg on the hook. The higher normal modes are obtained by decreasing the mass on the hook. Eventually, the mass of the empty hook will limit the number of normal modes that you can observe.
- Determine the tension in the string, the wavelength of oscillation, and the normal mode = (number of nodes - 1).
- Repeat for as many different normal modes as possible.
- Determine the linear mass density of the string using the method you designed in the Prelab.

Analysis:

- Plot the quantity m vs. λ^2 , where m is mass, and λ is wavelength. Put λ^2 on the horizontal axis, and m on the vertical axis. Is this a straight line??? (Indicate units.)
- Start with the formula from the prelab relating linear frequency, string tension, linear mass density, and wavelength. Write a formula for the linear frequency of vibration in terms of measured quantities only.
- Is the manufacturer's linear frequency $f=80$ Hz within your error bounds? In other words, can you verify that the tuning fork is operating as advertised?
- Identify at least two sources of statistical error.
- Identify at least two sources of systematic error.
- As usual, include Abstract, Conclusions, and other comments.