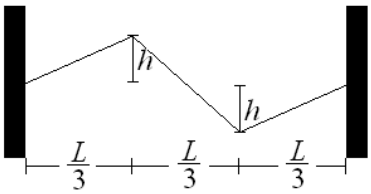
ECE 473
Homework Assignment #3
Due: Friday, September 21, 2018

1. Assume a forced, fixed string is driven by some source with a constant speed amplitude $\tilde{u}(0,t) = U_0 e^{j\omega t}$. Find the frequencies of maximum displacement amplitude of the standing wave. How does this compare to the derivation of standing waves from section 2.9 (a)?

2. A fixed, fixed string is given the initial displacement shown in the figure and then let go at $t = 0$. Determine the coefficients A_n and B_n for the string in terms of h and which frequencies will contribute to the motion of the string.



3. Problem 5.2.1a in Kinsler er al.

4. For an acoustic pressure $p=10^5\cos[20(300t - y)]$ Pa, where time is in seconds and y is in meters, in a material with ρ_o = 2,000 kg/m^3, find the speed and direction of propagation, the particle velocity, and the phase relation between acoustic pressure and particle velocity.

Note to graduate students taking the course for 4 credit hours: For the additional unit of credit, you are required to write a paper (typically about 8-10 pages, double spaced) that discusses in some detail any topic on acoustics for which the fundamentals of engineering acoustics are explicitly described (this should be a Typed Paper on Sound or what I like to call the **TPS report**). The paper is typically a summary of some acoustic topic and based on 4-5 peer-reviewed publications. The paper will be due Dec 12, 2018. However, topic and publications must be approved by me. For the approval process, prepare a one-page outline (including 4-5 peer-reviewed references) for submission **October 26, 2018**.