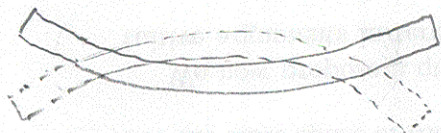


MATHS WORKSHEET : Mode excitation by percussion.

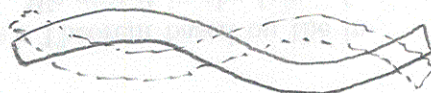
4/27/07
Bennett

Two Modes of a bar (eg xylophone bar) are as follows: (extremes of vibration shown)



mode a

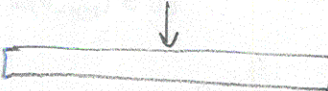
$$f_a = 300\text{Hz}$$



mode b

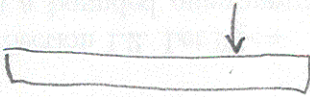
$$f_b = 700\text{Hz}$$

A) Label the nodes and antinodes for each mode.

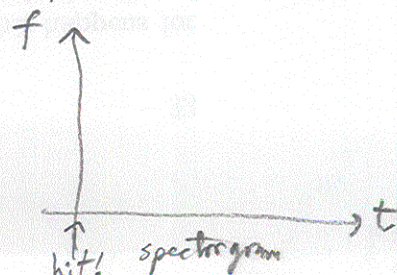
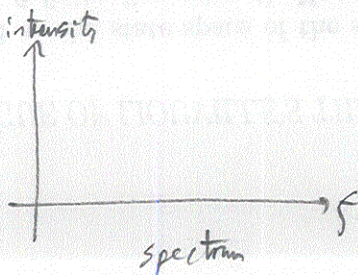
B) If you hit in the center  which mode(s) are excited?

What partials do you expect to hear?

Are a_1, a_2 each large, small or zero?

C) If you hit about 75% of the way along.  which answer the same questions.

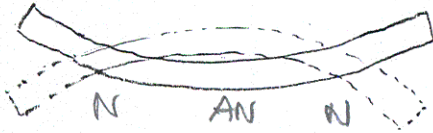
D) If you hit at a general place, sketch the spectrum heard & the spectrogram:



MATHS WORKSHEET : Mode excitation by percussion.

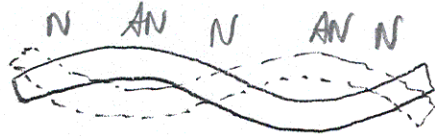
4/27/07
Bunnell

Two Modes of a bar (eg. xylophone bar) are as follows: (extremes of vibration shown)



mode a

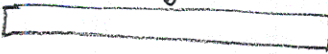
$$f_a = 300\text{Hz}$$



mode b

$$f_b = 700\text{Hz}$$

A) Label the nodes and antinodes for each mode.


B) If you hit in the center  which mode(s) are excited?
 mode a yes, but not mode b.
 What partials do you expect to hear?

300Hz

Are α_a, α_b each large, small or zero?

$$\alpha_a = \text{large}$$

$$\alpha_b = \text{zero}$$

C) If you hit about 75% of the way along.  which answer the same questions.
 since a has node there, expect $\alpha_a = \text{zero}$,
 but $\alpha_b = \text{large}$ since mode b is large there.

Hear 700Hz

D) If you hit at a general place, sketch the spectrum heard & the spectrogram:

