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Courses » Fundamentals of Acoustics

Announcements **Course** Forum Progress Mentor

Unit 5 - Week 04: Transmission line equations

Week 4: Assignment

The due date for submitting this assignment has passed. **Due on 2017-02-21, 23:59 IST.**

Submitted assignment (Submitted on 2017-02-12, 20:27)

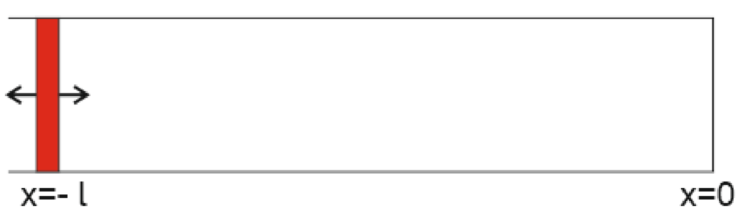
1) Transmission Line equation for pressure is $p(x,t) = Re[P(x,s)e^{st}]$. In general,P(x,s) is: ***1 point***

- ○ $P(x,s) = [P_+(s) - P_-(s)]e^{\frac{sx}{c}}$
- ○ $P(x,s) = [P_+(s) + P_-(s)]e^{\frac{sx}{c}}$
- ○ $P(x,s) = P_+(s)e^{\frac{-sx}{c}} - P_-(s)e^{\frac{sx}{c}}$
- ◉ $P(x,s) = P_+(s)e^{\frac{-sx}{c}} + P_-(s)e^{\frac{sx}{c}}$

2) What is true regarding characteristic impedance (Z_0) ? ***1 point***

- ○ It depends on frequency of sound wave through the media.
- ○ It is a complex quantity.
- ◉ It does not depend on boundary conditions.
- ○ It depends on position.

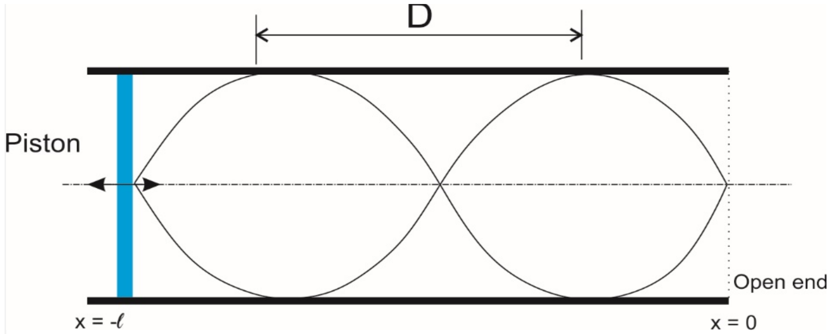
3) Consider a closed tube with a reciprocating piston at one end as shown in figure. ***1 point***



Velocity envelope of a velocity standing wave formed inside the tube is:

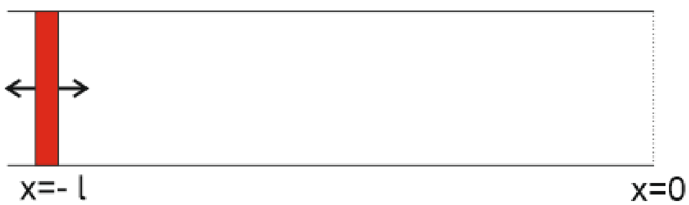
- ◉ $\frac{P_1}{Z_0 Cos\frac{\omega l}{c}} \; Sin\,\frac{wx}{c}$
- ○ $\frac{P_1}{Z_0 Sin\frac{\omega l}{c}} \; Sin\,\frac{\omega x}{c}$
- ○ $\frac{P_1}{Z_0 Cos\frac{\omega l}{c}} \; Cos\,\frac{\omega x}{c}$
- ○ $\frac{P_1}{Z_0} \; Sin\,\frac{\omega x}{c}$

4) Consider an open tube having a reciprocating piston (sound source) at one end. The other end is open to atmosphere. During sound propagation inside the tube a standing wave for pressure will be generated as shown in the figure. Calculate the length D. ***1 point***



- ( ) λ
- ( ) λ/4
- (•) λ/2
- ( ) λ/8

5) Consider an open tube with a reciprocating piston at one end as shown in figure. **_1 point_**



A pressure and velocity standing wave is formed inside the tube when sound propagates through the tube. In this scenario, choose the correct statement given in following options.

- ( ) At x=0, pressure is zero and velocity is at its maximum.
- ( ) At x=- l, pressure is zero and velocity is at its maximum.
- ( ) At x=0, pressure is maximum and velocity is at its maximum.
- ( ) At x=-l, pressure is maximum and velocity is at its maximum.

6) Choose the correct statement from the following options. **_1 point_**

I. Amplitude of a travelling wave varies with position.
II. Amplitude of a standing wave varies with position.
III. Amplitude of a travelling wave is a constant.

- ( ) I and II
- ( ) I and III
- (•) II and III
- ( ) III

7) **_1 point_**

Specific acoustic impedance $(Z_L)$is defined as: $(U(x,\omega)$- Complex Velocity and $P(x,\omega)$ - Complex Pres

- ( ) $\left.\frac{U(x,\omega)}{P(x,\omega)}\right|$
- (•) $\left.\frac{P(x,\omega)}{U(x,\omega)}\right|$
- ( ) $\left.\frac{Re[U(x,\omega)]}{Re[P(x,\omega)]}\right|$
- ( ) $\left.\frac{Re[P(x,\omega)]}{Re[U(x,\omega)]}\right|$

8) **_1 point_**

One of the solutions of a 1D wave equation is $u(x,t) = F(x-ct) + G(x+ct)$. Here, function G repres

- ( ) Forward travelling wave.
- (•) Reflected wave.
- ( ) Standing wave.
- ( ) None of the above.

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