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Unit 4 - Week 03: Wave equation

Course outline

How to access the portal?

Week 01: Introduction and Terminology

Week 02: Concept Review

Week 03: Wave equation

- Lesson 1: Bode Plots (Magnitude) for Complex Transfer Functions
- Lesson 2: Momentum Equation for 1-D Sound Propagation
- Lesson 3: Continuity Equation for 1-D Sound Propagation

Week 3 Assignment

The due date for submitting this assignment has passed.

Due on 2017-02-14, 23:59 IST.

Submitted assignment

1) What is the meaning of *constant mass* assumption considered during the derivation of wave equation? ***1 point***

- Mass flow is constant.
- Fluid can receive and expel energy.
- Mass flow is constant and fluid can receive and expel energy.
- Mass flow is not constant and fluid can't receive and expel energy

2) When an acoustic wave passes through a gas, which of the following thermodynamic processes accurately captures the behavior of the gas? ***1 point***

- Isobaric process.
- Isochoric process.
- Isothermal process.
- Adiabatic process.

3) Which of the following options is not required for deriving the 1-D Wave Equation? ***1 point***

- Newton's 2nd law of motion.
- Conservation of mass.
- Equilibrium of moment.
- Gas law.

4) During sound wave propagation in fluid media, particle acceleration is directly proportional to _____? ***1 point***

- velocity gradient.
- pressure gradient.

- Lesson 4: Gas Law for 1-D Sound Propagation
- Lesson 5: 1-D Wave Equation
- Lesson 6: Solution for 1-D Wave Equation
- Quiz : Week 3 Assignment
- Week 3 Assignment Solution

Week 04: Transmission line equations

Week 05: 1-D Waves

Week 06: Power and spherical waves

Week 07: Spherical waves and interference

Week 08: Directivity and mufflers

Week 09: Sound in rooms

Week 10: Reverb time and FFT

Week 11: Weighting and loudness

Week 12: Miscellaneous topics and

- square of velocity gradient.
- square of pressure gradient.

5) Which of the following options correctly represents the linearized equation of momentum for 1D wave propagation? ***1 point***

- $(\partial p/\partial x) = (\rho\_o)\ (\partial u/\partial t)$
- $(\partial p/\partial x) = (-\rho\_o)\ (\partial u/\partial t)$
- $(\partial u/\partial x) = (\rho\_o)\ (\partial p/\partial t)$
- $(\partial u/\partial x) = (-\rho\_o)\ (\partial p/\partial t)$

6) What is the definition of *mass flux*? ***1 point***

- Mass flow per unit area.
- Rate of mass flow per unit area.
- Rate of mass flow.
- All the options are correct.

7) How does particle velocity gradient influence rate of change of fluid volume during sound propagation? ***1 point***

- Positively.
- Negatively.
- Not influences.
- Negatively but both are inversely proportional.

8) What is the right comment regarding a sound pressure wave represented by, $p(x,t)=f(t-x/c)$? ***1 point***

- Sound wave travelling to positive x direction.
- Sound wave travelling to negative x direction.
- Sound wave travelling to both positive and negative x directions.
- None of the options are true.

9) Which of the following option can be considered as a transfer function ? ***1 point***

- $H(s)=(Output\ current)/(Input\ current)$
- $H(s)=(Output\ current)/(Input\ voltage)$
- $H(s)=(Output\ voltage)/(Input\ current)$
- All of the options can be considered as transfer functions.

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