

(SW.L2.3) Practice Stage

Thursday, March 29, 2018 8:34 PM

Superposition of Waves (SW): Standing Wave Resonance, Beats, Two Source Interference

Practice Stage:

Post-lecture 2: Two Source Interference

Reading

1. none

Lecture Videos

1. none

Example Problems

1. none

Simulations

1. none

Other Suggested Content

1. none

Practice

1. none

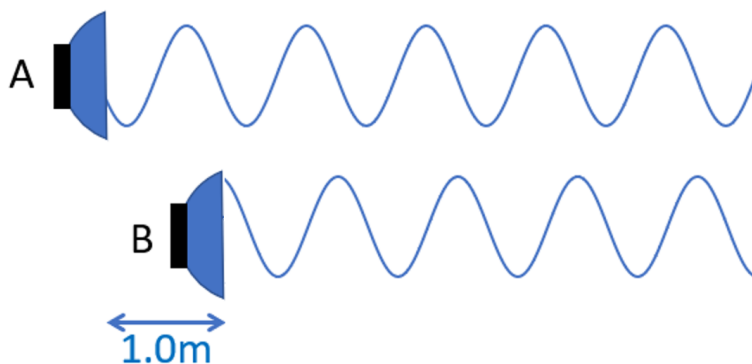
Homework

SW.L2.3-01

Description: Superposition of standing waves

Learning Objectives: []

Problem statement: Wave A and Wave B have wavelength 2.0 m. How could you move Speaker B to make completely constructive interference between the waves? Note: These speakers are not in phase.



- (1) Move Speaker B forward 0.5 m
- (2) Move Speaker B backward 0.5 m
- (3) Move Speaker B forward 1.0 m

- (4) Move Speaker B backward 1.0 m
- (5) Move Speaker B forward 1.5 m
- (6) Move Speaker B backward 1.5 m
- (7) Wave A and Wave B already have completely constructive interference

Answer: (2), (5)

SW.L2.3-02

Description: PLD and interference points

Learning Objectives: [x,xx,...] Put the learning objective numbers here

Problem Statement: It is noticed that the shortest path length difference that produces constructive interference from an unknown source is 128 m.

(a) What is the wavelength of the source?

Answer: 128 m

(b) At which of the following path length differences will constructive interference occur?

- | |
|------------|
| (1) 64 m |
| (2) 180 m |
| (3) 256 m |
| (4) 320 m |
| (5) 512 m |
| (6) 832 m |
| (7) 3264 m |
| (8) 4096 m |

Answer: (3), (5), (8)

(c) At which of the following path length differences will destructive interference occur?

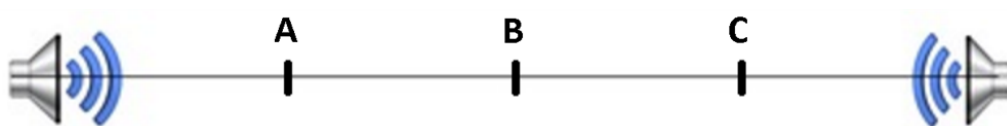
- | |
|-----------|
| (1) 64 m |
| (2) 180 m |
| (3) 256 m |
| (4) 320 m |
| (5) 512 m |

- | |
|------------|
| (6) 832 m |
| (7) 3264 m |
| (8) 4096 m |

Answer: (1), (4), (6), (7)

SW.L2.3-03

Problem Statement: Two speakers, 4 m apart, produce identical 343 Hz sound waves.



(a) Where is the path length difference (PLD) from the two speakers equal to zero?

- | |
|---------------|
| (1) A |
| (2) B |
| (3) C |
| (4) Not shown |

Answer: (2)

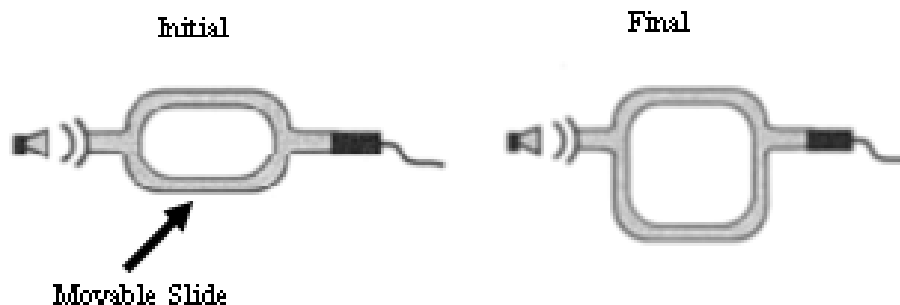
(b) How many constructive interference points exist *between* (ignore endpoints) the two speakers? Hint: you can solve this with a physical representation (picture) or the PLD equation. Use both to check your work.

- | |
|-------|
| (1) 1 |
| (2) 2 |
| (3) 3 |
| (4) 4 |
| (5) 5 |
| (6) 6 |
| (7) 7 |
| (8) 8 |

Answer: (7)

SW.L2.3-4

Problem Statement: A speaker generates a continuous tone of 1240 Hz. In the drawing, sound travels into a tube which splits into two segments, one fixed in length, and one with a movable slide like a trombone. The sound waves recombine before being detected by a microphone. The tube is initially at a state that produces a loud sound, and the speed of sound in air is 343 m/s. While slowly sliding the moveable segment out it is noticed that the sound gets soft and then loud again 10 times.



(a) Every time the sound goes from loud to soft and then loud again the Path Length Difference between the two paths changes by how much?

- | |
|-----------------|
| (1) $\lambda/2$ |
| (2) λ |
| (3) 2λ |
| (4) 5λ |
| (5) 10λ |
| (6) 20λ |

Answer: (2)

(b) How far has the slide been moved out during this action? (Hint: one common mistake makes you off by a factor of 2)

- | |
|-----------------|
| (1) $\lambda/2$ |
| (2) λ |
| (3) 2λ |
| (4) 5λ |
| (5) 10λ |
| (6) 20λ |

Answer: (4)

SW.L2.3-01

Description: xx

Learning Objectives: [x,xx,...] Put the learning objective numbers here

Problem Statement: xx

(a) xx

Answer: (x)

(b) xx

Answer: (x)