

21M.380 MUSIC AND TECHNOLOGY

SOUND DESIGN

READING ASSIGNMENT 4 (RD4)

PHYSICS OF SOUND

DUE: WEDNESDAY, FEBRUARY 17, 2016, NOON
SUBMIT TO: MIT LEARNING MODULES ▶ ASSIGNMENTS
0.5% OF TOTAL GRADE

1 Materials to study

- Farnell, Andy (2010a). "Physical sound." In: *Designing Sound*. Cambridge, MA and London: MIT Press. Chap. 3, pp. 9–37. ISBN: 978-0-262-01441-0. MIT LIBRARY: [001782567](#). Hardcopy and electronic resource.
- (2010b). "Oscillations." In: *Designing Sound*. Cambridge, MA and London: MIT Press. Chap. 4, pp. 39–53. ISBN: 978-0-262-01441-0. MIT LIBRARY: [001782567](#). Hardcopy and electronic resource.
- (2010c). "Acoustics." In: *Designing Sound*. Cambridge, MA and London: MIT Press. Chap. 5, pp. 55–75. ISBN: 978-0-262-01441-0. MIT LIBRARY: [001782567](#). Hardcopy and electronic resource.

2 Questions to respond to

1. Imagine trying to recreate the acoustic experience of getting trapped in a thunderstorm during a hike in the mountains. Why would knowledge of the speed of sound become an essential property of any model that describes such an acoustic situation? How could you use this knowledge to make such a model more realistic? Describe the audible effect of that improvement, assuming that the next mountain to your left is 340 m away, and another one to your right is 170 m away.
2. Figure 4.9 in Farnell (2010) describes the acoustics of a bar clamped at one end. Describe a few examples of everyday objects whose sound could be synthesized based on this principle.
3. What is the difference between the geometric attenuation of sound, as described in figure 5.4 of Farnell's book, and the attenuation of sound due to atmospheric absorption, as described by Stokes Law (equation 5.9 in the book)? Describe the difference

in terms of both, cause and effect of these two phenomena. Try to relate this to your everyday experience of sound.

4. Find the error in the right half of figure 5.8 in Farnell (2010), which explains the Doppler shift. Explain.

3 Guidelines

- Your answers need not be very extensive (a short paragraph per question is enough), but they should demonstrate that you have actually read the article and understood its main points.
- Try to be concise and pay attention to form, grammar, spelling, etc.

References and useful resources

Farnell, Andy (2010). *Designing Sound*. Cambridge, MA and London: MIT Press. 688 pp. ISBN: 978-0-262-01441-0. MIT LIBRARY: [001782567](#). Hardcopy and electronic resource.

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