

3.1: Background Material

Text References

- [speed of compression waves in solids](#)
- [standing wave harmonics](#)

Sound Waves in Solids

Unlike through fluids, when compression waves move through solids, the particles in the medium that is vibrating are *not* free to roam, and therefore really do oscillate. Our previous study of standing waves involved strings, which necessitated creating fixed endpoints. For compression waves in a solid metal bar, as we will study in this lab, the endpoints are free to move, so our standing waves in this case have different boundary conditions.

Squelching Harmonics

Most of the energy in a standing wave is contained near the antinodes, because that is where the medium is moving the fastest. Near the nodes there is very little of the standing wave's energy. If we damp the motion of a single position in a standing wave (like pinching a small segment of a string) then the harmonics that have an antinode near that position will lose their energy, while harmonics that have a node at that position will hardly be affected. We can't make the metal bar in this experiment float in mid-air for us – we have to hold it somewhere as we create the standing wave. Wherever we decide to hold it will have a dampening effect on the standing wave, so depending on what harmonics we want to observe, the bar will need to be held differently.

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