

### 11.3.2: Impedance Simulation

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In many cases a wave colliding with a boundary will partially reflect and be partially transmitted. The kind of wave reflected and the amount of energy transmitted depend on the properties of the material on either side of the boundary. This animation again simulates a string as a row of individual masses connected by invisible springs. In this case the mass of the string is different on the left as compared with the right. A similar reflection occurs when a sound wave confined to the inside of a tube encounters the open end of a tube where the air can move freely.

#### Simulation Questions:

1. Run the simulation and describe what happens when a pulse goes from a light string to a heavy string.
2. Click the 'Heavy to Light' button, run the simulation and describe what happens when a pulse goes from a heavy string to a light string.
3. In which case is the reflected pulse inverted? Based on what you learned about reflections from soft and hard boundaries in the previous simulation, explain this result.
4. In which case is the reflected pulse larger than the transmitted pulse?
5. In which case is the reflected pulse faster? Based on what you learned about how physical properties determine the speed of a wave, explain this result.

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