Examples *Tiny*FEM

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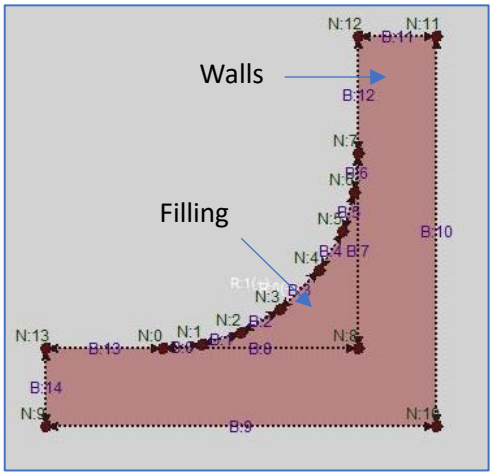
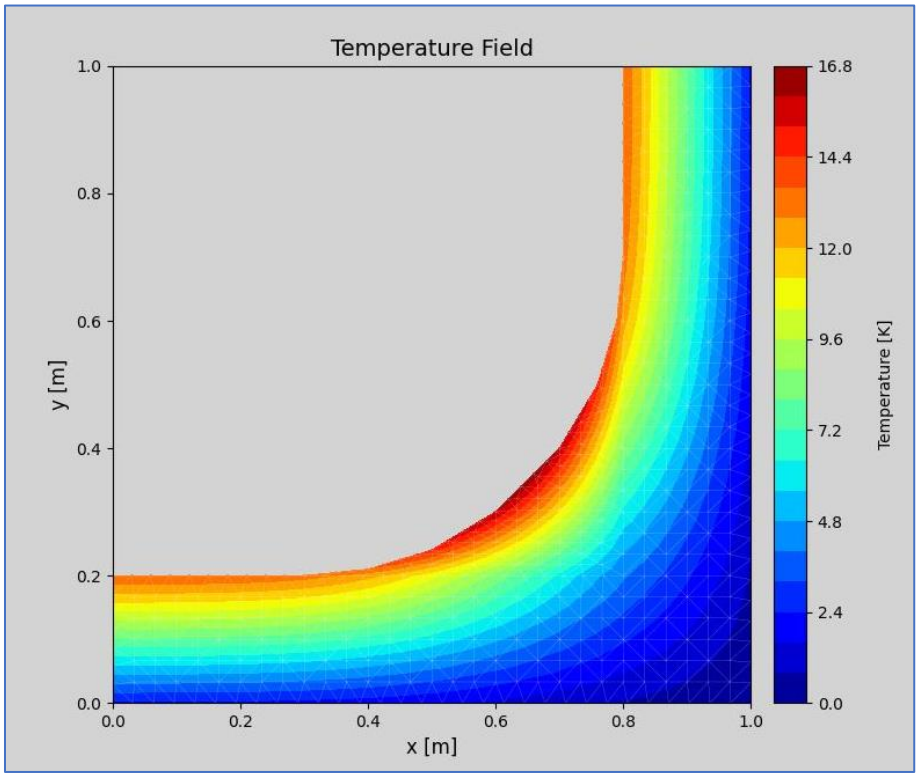
Heat Equation

Example 1

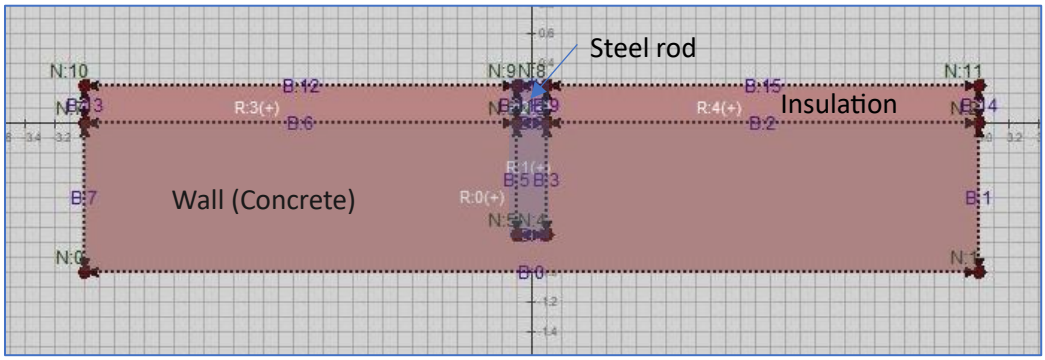
- Walls: k = 1 W/mK
- Round filling: k = 0.5 W/mK
- Outside: T = 0 °C h = 25 W/m²K
- Inside: T = 25°C h = 5 W/m²K

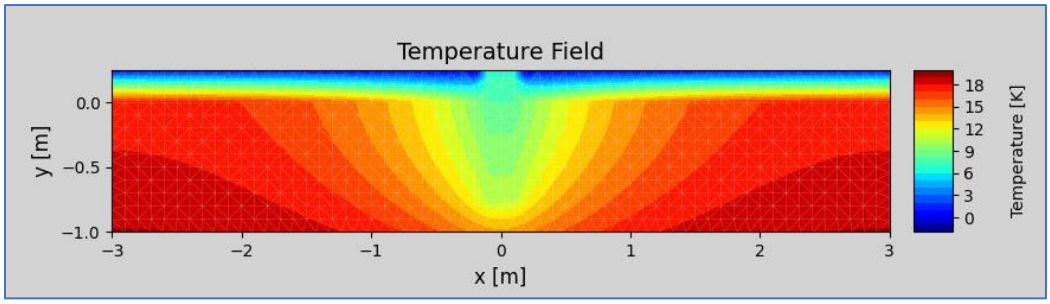




Example 2

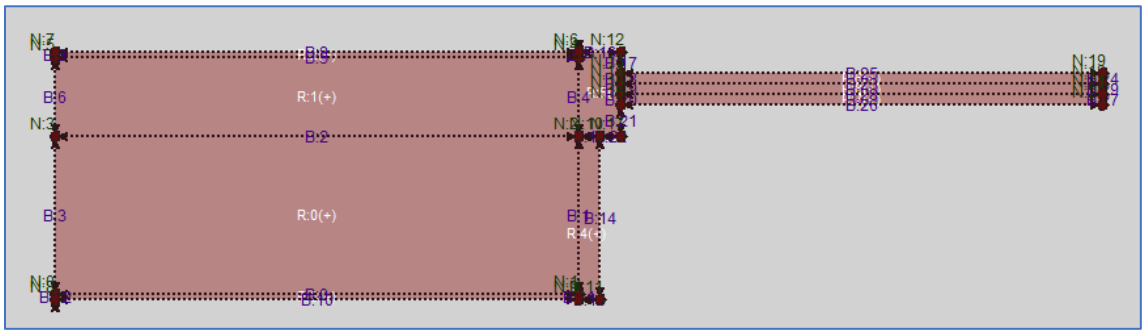
- Metal rod through insulation
- Outside: T = 0 °C h = 25 W/m²K
- Inside: T = 20°C h = 4 W/m²K

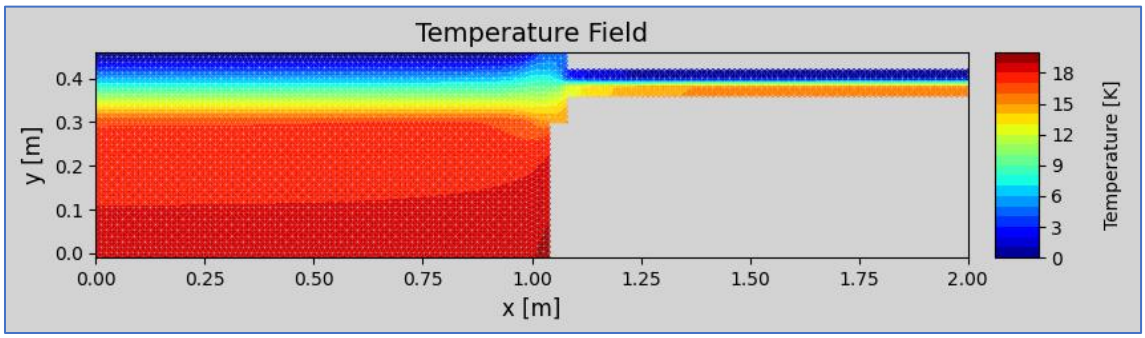




Example 3

- Some wall structure with embedded double pane window and different materials

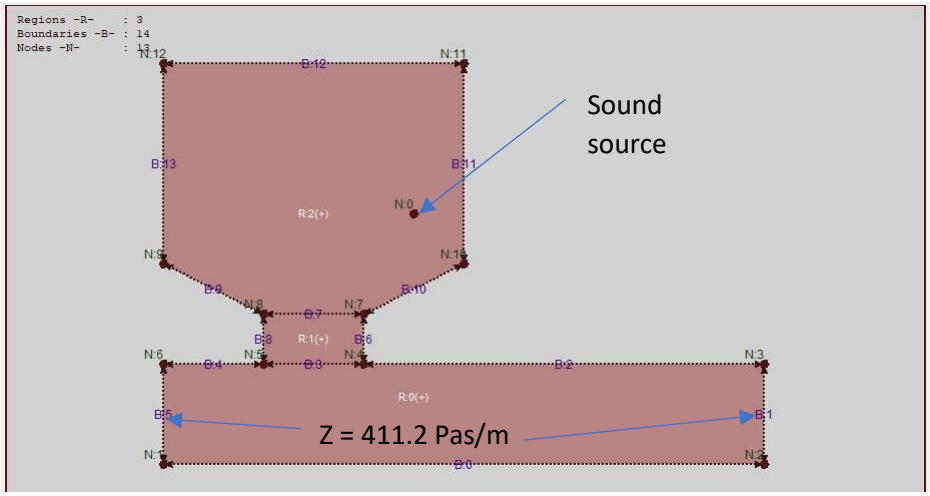


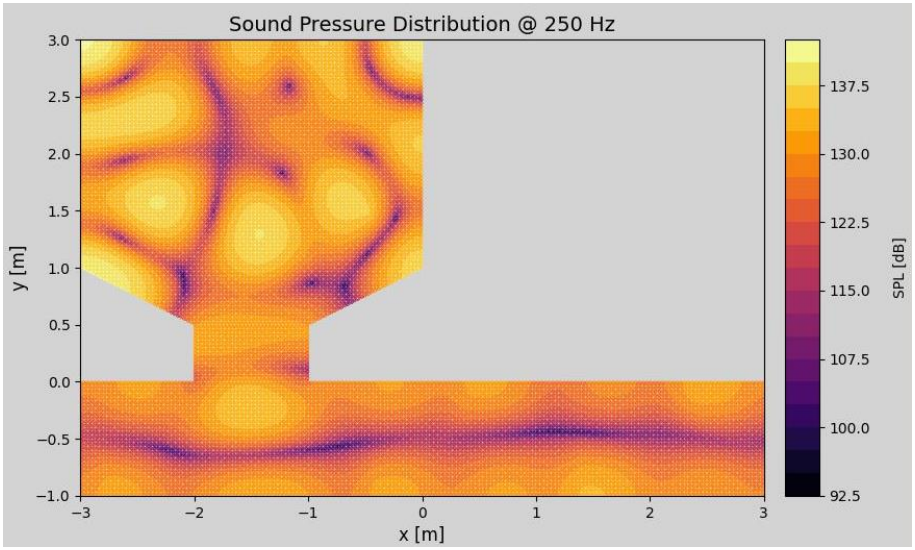


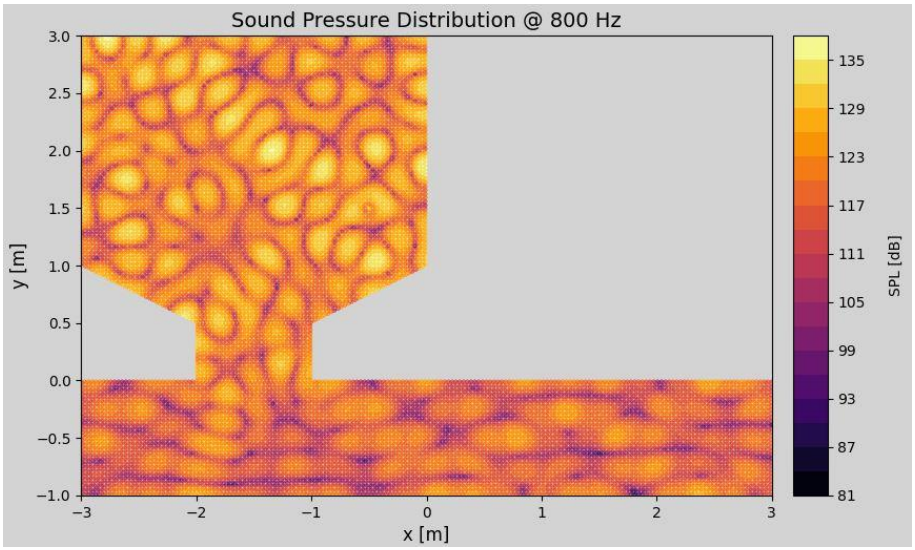
Helmholtz Equation

Example 1: Hallway

- Sound propagation in hallway (medium air)

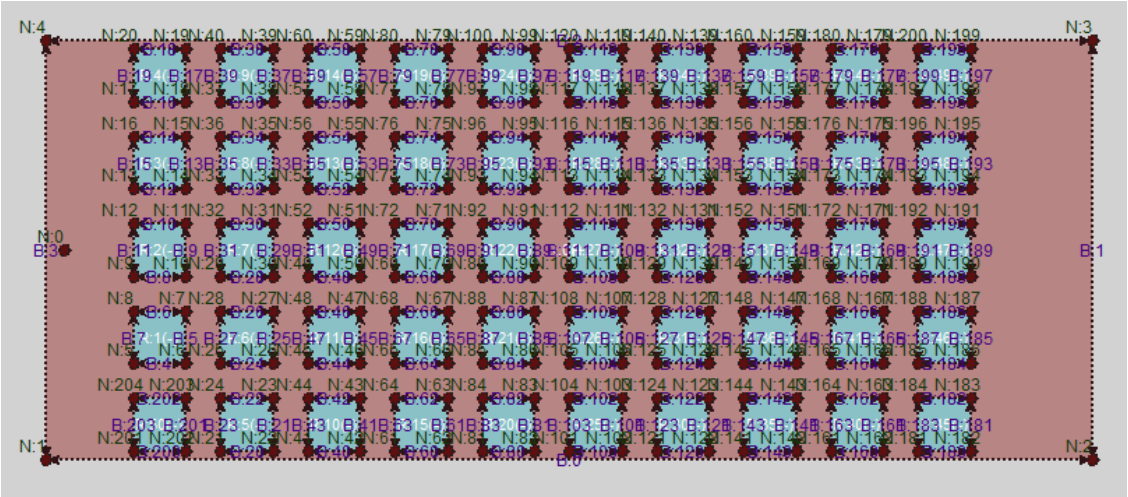


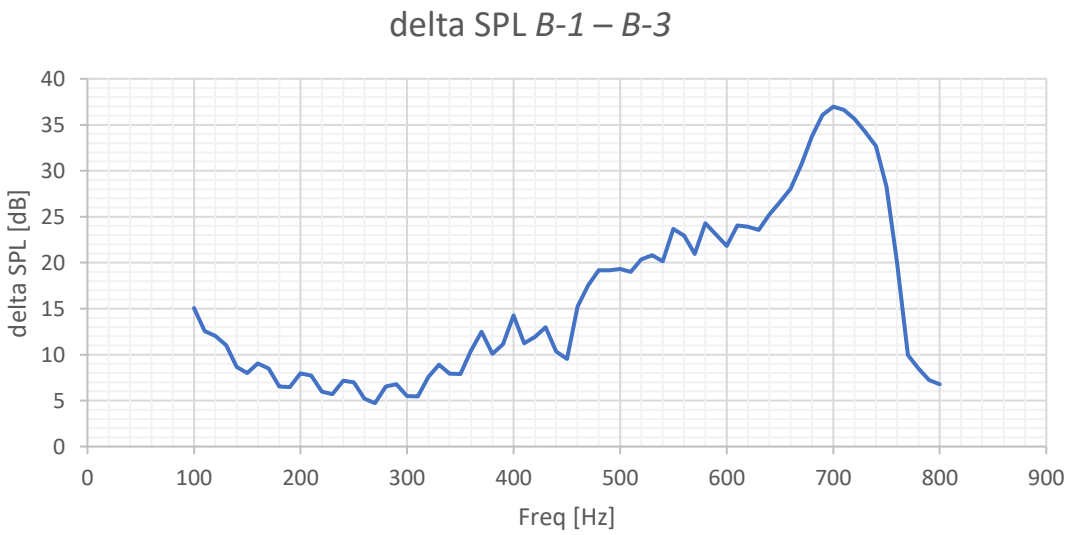




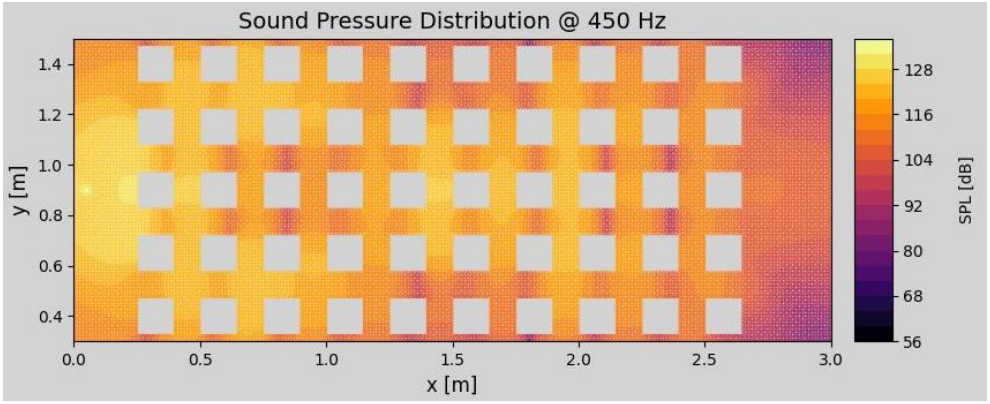
Example 2: Phononic Crystal

- A phononic crystal is a material or structure designed to control the propagation of sound waves in a way that allows certain frequencies of sound to be blocked or allowed to pass through.
- https://en.wikipedia.org/wiki/Acoustic_metamaterial

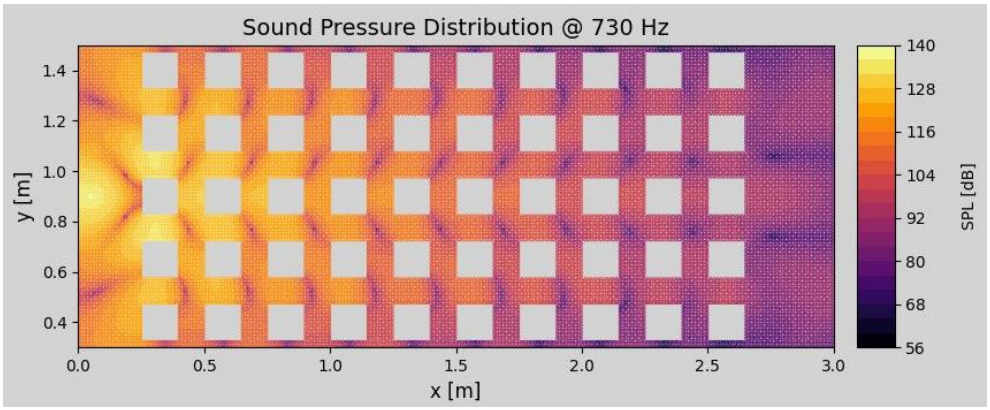




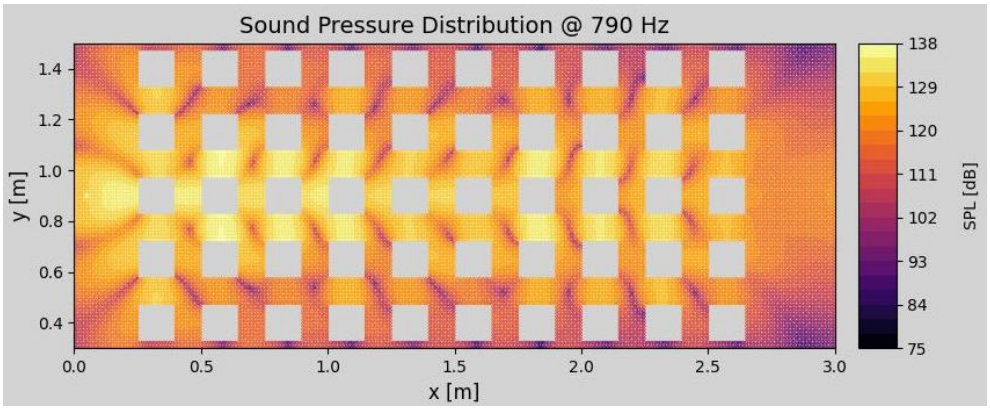
Blocked frequency:



Bandgap frequency:

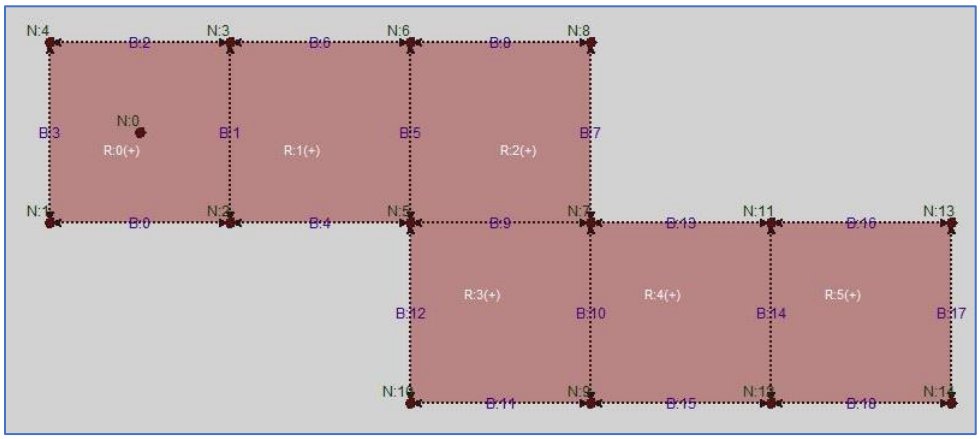


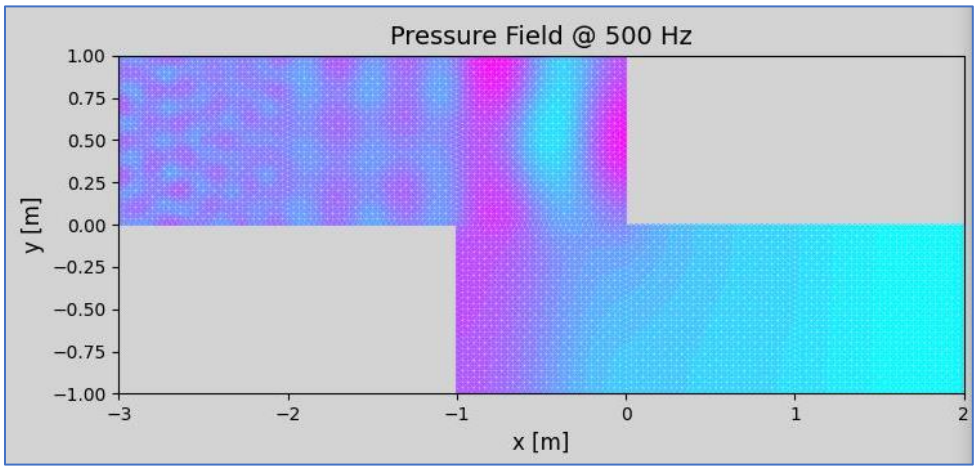
Blocked frequency:



Example 3: Sound propagation through different materials

- Varying values for speed of sound and density for regions





Example 4: Sound barrier